POST-NASAL CATARRH

AND

DISEASES OF THE NOSE CAUSING DEAFNESS.

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CAUSING

DEAFNESS

BY

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PREFACE TO THE THIRD EDITION.

The present volume deals with a department of disease subsidiary to that which is usually considered the special domain of the aural surgeon. It has for its subject the catarrhal lesions of the naso-pharynx of which ear disease and deafness are secondary and later issues. These antecedent conditions in many instances persist along with their contributory defects in the organs of hearing; and it is matter of experience that when this is the case, treatment directed simply to alleviate the ear mischief, will result in disappointment.

For these reasons it has appeared to the author, that he could in no more practical way, add to the usefulness of this edition, than by introducing some account of the diseases of the nose and adjacent organs which lead up to deafness, with the methods of treatment which have approved themselves to him.

Thus while adding to the range of subjects, the original plan of the work is retained—that, viz., of supplementing information not usually provided in text books on the ear.

In considering the questions involved in this departure the author has been guided by the same physiological principles with which he essayed to elucidate the subjects of tinnitus and giddiness. That these principles should

lend themselves with equal facility to the new situation, is not without value as evidence of their correctness.

To fortify this physiological position, as well as to make intelligible the explanations offered of the morbid phenomena discussed in the context, an introductory chapter has been added, in which his theory is re-examined, receiving such amplification as the later study of the subject has enabled him to bring to its support.

The space required to do only cursory justice to the new matter has so far exceeded the original design, that it has been thought desirable to issue this instalment of the work as a separate volume. The subjects comprised in the succeeding volume being quite distinct, it is hoped that no inconvenience will attend the temporary severance of the completed work, by the plan now adopted.

In conclusion, the author wishes to acknowledge the assistance of his friend Mr. Coleman Jewell, M.B., in supervising the letter press, indexing, &c., by which the labour of publishing has been considerably lightened.

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January 1884.

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CATARRH, AND DISEASES OF THE NOSE CAUSING DEAFNESS.

CHAPTER I.

INTRODUCTORY OBSERVATIONS ON THE CORRELATING AND REFLEX FUNCTIONS OF THE SYMPATHETIC SYSTEM.

A BRIEF introductory outline of the physiological basis upon which the following studies is founded, will enable the reader to follow these with greater advantage, and also render unnecessary the repetition of details which would otherwise be required to make clear the subject under review.

It will be seen that the diseases and lesions about to be discussed, have their point of departure in certain modifications of nutrition in the regions implicated, and that these are followed by alterations of function in the local mechanism involved.

The term "modifications of nutrition" includes all the processes of inflammation whether acute or chronic; as well as some hypertrophies of tissue which are either congenital, or originate shortly after birth.

The particular conditions which mediate these changes will be seen to possess a *uniformity of type*, and my object will be to differentiate these by tracing them as far as may be possible to the initial stage of the process in each.

The significance of the term just made use of, "uniformity of type," will be obvious from the considerations which follow. From these it will be seen that the modifications of nutrition to be examined, are all of them traceable to an anatomical mechanism normally operating in the healthy

economy, and represent exaggerations of normal work on the one hand, or repressions of this healthy action on the other.

The resultants of these modifications will vary according as the exaggerations or the repressions are sudden and transient, or, as they are slow and prolonged. The element of *intensity* in either direction, is an important one in determining the issue.

The *anatomical mechanism* to the consideration of which these remarks lead, will be found in that portion of the nervous system constituted by the *ganglia of the sympathetic* chain and its afferent and efferent branches. By far the most important fact in connection with the sympathetic system is, that with one or two exceptions all sensori-motor nerves include fibres belonging to it; these sympathetic fibrillæ proceed to their companion cerebral or spinal nerve from that ganglion which is nearest to the latter when it issues from the spinal canal, or, that join it from ganglia near which it passes in its course.

These sympathetic fibres are *afferent* in their function as regards the ganglion, *i.e.*, they convey impressions *from the tissues* to which they are distributed, to the ganglion; or, beyond it to centres within the spinal cord. They may be looked upon as taking this ganglion in their course to the general vaso-motor centre hypothetically seated in the medulla oblongata; but it must not be forgotten that when these fibres thus enter a ganglion they communicate with its caudate cells. This important fact brings them into communication with another set of nerves coming from very different directions to the same ganglion. When these afferent sympathetic fibres pass out of the ganglion they do so by one of the two fasciculi or roots connecting it with the spinal cord, in which they are prolonged to the primary vaso-motor centre. The exact seat of this latter has not been determined for the human subject, though accurately fixed in the rabbit.

It is necessary to emphasize the fact of the organic communication of these afferent sympathetic nerves with the anatomical elements of the ganglion through which they pass, because this arrangement gives to them a terminal significance as regards some part of their functions, and places the ganglion in the light of a centre with reference

to these functions, the full meaning of which will shortly become apparent.

The second set of fibrillæ referred to as entering the ganglion proceed by a similar course *from* the general centre, also along the anterior columns of the cord, which they leave opposite an intervertebral foramen to join a given sympathetic ganglion, thus constituting its second root. These, similarly to the preceding afferent fibrillæ, mingle with the intrinsic caudate cells of the ganglion, after which they quit it to seek their several destinations on the *coats of the arteries.* They are *efferent* or centrifugal in their function, conveying impressions from the general centre or the sub-centre constituted by their ganglion, to the arteries, whose calibre it is their function to regulate. Hence they are usually designated "vaso-motor" nerves.

This nomenclature, though useful to indicate the particular property of a section of the sympathetic system, is not without its disadvantage, as tending to isolate and individualise a function by assigning to the efferent members of the scheme an office which is undoubtedly shared between both afferent and efferent fibres. Because, and this is the main contention of this thesis, both elements of the system are in reflex relationship with one another, and that by means of this relationship established as has been shown by their organic communication in the ganglia, tissue impressions are conveyed along one set of fibres to the ganglion, which are reflexly transmitted from it along the efferent channels to the vessels, whereby the blood supply is meted out according to the impressions communicated.

Probably it will be found a not incorrect inference to regard these centres whether primary or secondary as after all playing a subservient part to the tissues which animate them. From this point of view they will be reduced to the level of stations for receiving and transmitting impressions originating in the vital work of the areas with which they communicate, and therefore devoid of any power of originating such impressions, though they do undoubtedly modify the impulses passing through them, according as their vigour or vital energy, is less or more than normal. In the former case we get the phenomena of paresis, of a central or sub-central origin.

Apart from this consideration, however, and as the re-

sult of the study of numerous morbid conditions involving the sympathetic apparatus as a whole, I have been led to conclude that the sympathetic ganglia not only play the part of secondary centres or sub-centres, receiving and transmitting impressions *quite independently of the general centre;* but that they are also *correlating organs* by means of which afferent tissue impressions from one direction are reflexly referred to a totally different tract, where they find expression as modifications of vessel-calibre in that tract; the afferent impressions being manifested through their medium as efferent impulses in the area to which they are thus reflected. In other words, the sympathetic ganglia are to be regarded as so many stations situated on the lines traversed by vaso-motor impressions, in which the "points" so to speak, are managed, and by means of which, impulses are transferred from one line to another. Or, to borrow another analogy from the now familiar domain of electricity, these ganglia whether primary or secondary act as accumulators of force generated in the vital processes of the tissues, whence it is distributed along lines also communicating with these reservoirs, and which transmitted force expresses itself in alterations of arterial capacity.

Thus it becomes apparent that the sympathetic system as above sketched constitutes a mechanism for regulating the blood supply of the tissues, and consequently its members formed by the afferent and efferent nerves with their ganglionic centres, constitute the real and only media by which *trophic* changes are accomplished in the animal economy. This mechanism I submit suffices to cover all the work done in this domain.

The inextricable confusion, which has hitherto surrounded the subject of trophic nerves, and which is seen in all writers alike, arises from the failure on their part to recognise the true *reflex* relationship existing between the three members of the system. Vivisection experiments and observations of morbid phenomena, the only true bases of correct inference, though affording all the elements of proof, have hitherto given no clue to the situation because of this oversight.

Perhaps the commonest illustration of the confusion of ideas on this subject is shown in attributing to certain

spinal nerves the function of vaso-motor nerves, because when these are divided trophic changes are observed in the parts supplied by the divided nerve:—*e.g.* Prof. Foster quotes the observation that when the nerve supplying an ordinary thin skeletal muscle in the frog is divided, there follows dilatation of the vessels supplying this muscle. If now the cut nerve be stimulated the muscle contracts. The Professor's inference from these observed phenomena is that "these nerves belong sometimes to the sympathetic sometimes to the cerebro-spinal system, and are called vaso-motor nerves." It is clear, however, that the nerve here divided was a true motor nerve, because irritation of it caused muscular contraction. But its division is attended with vaso-motor phenomena also. Hence, it is obvious, that this nerve contained sympathetic fibres, *i.e.*, the fibres communicating with a sympathetic ganglion, which are afferent to that ganglion; it contained motor, and afferent sympathetic fibres. It was not the division of these latter that caused the vessels of the muscle to dilate, at least only in an indirect and reflex manner. The *vessels* of the muscle implicated in this experiment must have received their vaso-motor nerves from the same ganglion which supplied afferent sympathetic fibres to the spinal nerve of the muscle, and with these the nervi vasorum of the muscle were in reflex relationship. The vessels dilated as is their wont, not because the cut nerve was endowed with vaso-motor properties directly from its centre in the spinal cord, but because it happened to contain afferent sympathetic fibres which were in direct reflex relationship with the nervi vasorum of the particular muscle under observation. The connecting link being the common union of both sets of nerves in the same ganglion.

But, it will be asked, why is it, that all spinal nerves when thus injured do not exhibit vessel phenomena, seeing that *ex hypothesi*, all contain afferent fibrillæ communicating with the ganglia? My answer to this query is that such injuries of spinal or cerebro-spinal nerves *do* invariably give rise to similar vessel phenomena, but not necessarily in the part under observation, but in some distant part, where the occurrence is overlooked. The question as to whether a divided spinal nerve will give rise to vaso-motor disturbance in the part observed, resides as will now

be apparent, upon the circumstance of whether or not the vessels of the part experimented upon are supplied with nerves from the same ganglion as furnished the sympathetic fibrillæ contained in the sheath of the divided spinal nerve.

This question which will receive further elucidation as I proceed, involves the larger one of what I have called "correlated tissue tracts or areas." As already stated, the afferent fibrillæ associated with sensori-motor nerves often belong to ganglia, whose efferent vaso-motor fibrillæ are distributed to vessels going to quite other regions. Hence, though injury to the former will be assuredly accompanied by its reflex response in vessel disturbance, this disturbance must not necessarily be looked for at the seat of injury, it may be entirely exhibited in *e.g.* the viscera.

It will be apparent therefore that to assign vaso-motor properties, *i.e.* vessel dilator or contractor properties to individual sensori motor nerves, or to withhold these attributes from others, is entirely beside the mark. They are all alike with some two or three exceptions endowed with these properties. Only, to recognise them, the *reflex* character of the vaso-motor function must be fully realised.

It will further be apparent that herein lies the elucidation of the modus operandi of counter-irritants, as well as of many morbid phenomena that are vaguely spoken of as "sympathetic." No better instance of this sort of reflex action, so distributed as to constitute a correlated tissue tract, can be afforded than is seen when burns of the chest are followed by a duodenal ulcer. Here the afferent sympathetic fibrillæ associated with the injured cutaneous spinal nerves implicated in the burnt integument are in reflex relationship, through their ganglion, with the nervi vasorum of the arteries supplying the duodenal mucous membrane; though the evidence in this case goes to show that the impulse is in its issue one of vessel-contraction, rather than of dilatation, the resulting ulcer being a tissue necrosis the sequence of starvation, from this reflexly-excited obliteration of its blood supply.

The issues of gunshot injuries of the brachial nerves, give evidence of similar atrophies of muscle and of skin, often proceeding to ulceration, as is seen in the instance immediately preceding. There is therefore no reason ac-

cording to Prof. Foster's argument why these brachial nerves should not be "called vaso-motor nerves" in as much as their injury induces vaso-motor phenomena. Yet happily for my contention in this instance, the recognised facts of anatomy supply all the links necessary to substantiate it. Because all the nerves of the brachial plexus contain sympathetic (afferent) fibres connected in the same ganglion, the inferior cervical, which supplies the nervi-vasorum to the brachial artery and its branches. But besides these trophic changes localised in the limb appertaining to the injured nerves, I shall shortly show that very remarkable phenomena in far-off regions attend such injury. owing to the correlating influence of this ganglion.

What purpose, I may ask, would be served by speaking of the brachial nerves as vaso-motor, or who on the well substantiated occurrences above glanced at, would speak or write of them as such? But I trust it will be conceded that a fundamentally useful purpose is subserved by pointing out the analogy plainly taught between these, and other sensori-motor nerves to which, for no better reason, vaso-motor functions have been attributed.

There is one other inference that appears to be borne out by the facts now under consideration, viz. that the ganglia distributed about the branches of the fifth and other cranial nerves, really belong to the series of the sympathetic ganglia proper, and that they subserve the same function of determining the reflexes and thereby correlating distant areas in regard of such impressions as pass to them. To some it may appear confirmative of this view that the number of these distinct pairs of ganglia corresponds with the four elemental vertebræ from which the cranial bones are considered by some anatomists to be developed. From a morphological point of view therefore it may be suggested that the otic, Meckel's, and the lenticular ganglia, with perhaps the sub-maxillary hold the same relations to the typical cranial vertebræ, as do the recognised ganglia of the sympathetic chain to the respective segments of the spine with which each pair of the series corresponds.

Regarding the particular work capable of being accomplished by the reflex vaso-motor mechanism as already sketched, it is seen to consist in some cases of prolonged vessel dilatation, in others of equally continued vessel con-

traction ; also, in alternations of these states. Much however remains to be accomplished in the direction of deciding what kind of stimulus produces dilatation and what contraction of vessels, and in this connection I submit the following remarks.

Whilst experimental physiologists generally attribute vessel constrictor functions to fasciculi distinct from those which occasion dilatation, the results of my studies of the morbid phenomena attending nerve lesions, tend to show that both constrictor and dilator results are capable of being mediated by the same nerves. The determination of this issue appears to depend upon the nature of the stimulus rather than upon the lines which it traverses.

The following summary of conclusions drawn by Morat and Dastre (*vide* Comptes Rendus 1878) from their early experiments to determine the influence of the sympathetic nerves on the circulation, is apposite to the question. They report thus—" Excitation of the cephalic end of the cut nerve is practised with interrupted induced currents. The effect is the gradual rise of the arterial pressure and lowering of the venous pressure. The elevation of the arterial pressure (contraction), comes on gradually, attains a maximum which does not last more than 20 or 30 seconds. Soon the pressure lowers again gradually, falls below its original level, maintains itself in this new equilibrium 2 or 3 minutes, after which it returns more or less exactly to its point of departure. But the unforeseen result of our research is that the initial constriction due to the excitation is always followed by a reverse modification; by a dilatation greater than that which is induced by the section of the sympathetic. This phenomenon of *super-dilatation* is remarkable for its long duration. Thus the anæmia provoked by the excitation of the sympathetic is of short duration, and gives place to a very strong congestion."

The conditions of the experiments show that irritation of the same nerve produces both contraction and dilatation in succession to each other : the latter being the more enduring result, in fact in another paragraph this is spoken of as lasting over six or seven days.

The element of duration of the stimulus therefore appears to have an important bearing on the issue. The instance quoted of injury to the brachial nerves points in this direc-

tion, because we get in these, first of all, dilator phenomena, skin congestion in fact, followed at a later date by anæmia of vessels and atrophy of tissues; *e.g.* glossy skin, wasted muscles, contracted tendons, &c. From this it appears that a stimulus of sufficient persistency, such as is implied in crushing of the nerves, as from bullet wounds (and it is recorded that the subsequent effects are always comparatively slight if the nerve be actually divided), or from their implication in such chronic ulcerative processes as burns produce—implies vessel contraction. Hence it would follow that the resultant of a reflex vaso-motor stimulus depends upon its duration. The experiments of Morat and Dastre, neither those just referred to nor the later ones, elucidate this fact, because they do not approximate in duration to those lesions which are attended with constrictor results. The fault of all these experiments, so far as the determination of this point is concerned, resides in the total division of the nerve experimented upon, because under these circumstances, when the dilator effect produced by the electric current has subsided, the normal state of things is reverted to. It requires therefore, a persistent irritation of an undivided nerve to induce pronounced constrictor effects.

Regarding the latest observations of Morat and Dastre, communicated while these pages were in the press, it is satisfactory to note that these accurate experimenters are coming to recognize the element of reflex action in these vessel phenomena, a fact which I have insisted upon for the last seven years, and the mechanism of which was delineated in a paper which I read in the medical section of the "International Medical Congress," 1881, and from which most of the following details are abstracted.*

It is probable that in man various regions of the spinal cord act as vaso-motor centres, over limited areas. At present the range of their operations is but little understood, and it may be that in animals made the subjects of vivisection experiments, some of the results are due to an even larger development of this massing of the subordinate vaso-motor centres in their spinal cords, than is the case in man. Should this be so however, it in no way affects

* Vide *Trans. Int. Med. Cong.*, 1881.

my contention, respecting the reflex relationship of the afferent and efferent elements of the vaso-motor system; it would simply seem to imply that for convenience of package, the functions of some of the ganglia of the sympathetic chain in man, are relegated in these animals to a zone of the spinal cord; or that these vaso-motor centres are not, in the animals in question, of sufficient importance in the economy to necessitate their individualisation as distinct centres of the sympathetic chain. The anatomy of the sympathetic system, even in man, has many links to be supplied, while in the lower animals from which most of the inferences are derived, it is even more obscure. The range of my subject being limited for the most part to the upper ganglia of the series whose anatomy has been perhaps most studied, and the inferences arrived at being based on the phenomena exhibited in the human subject, these will be redeemed from whatever obscurity may in other regions and in the lower animals, be due to the causes above intimated.

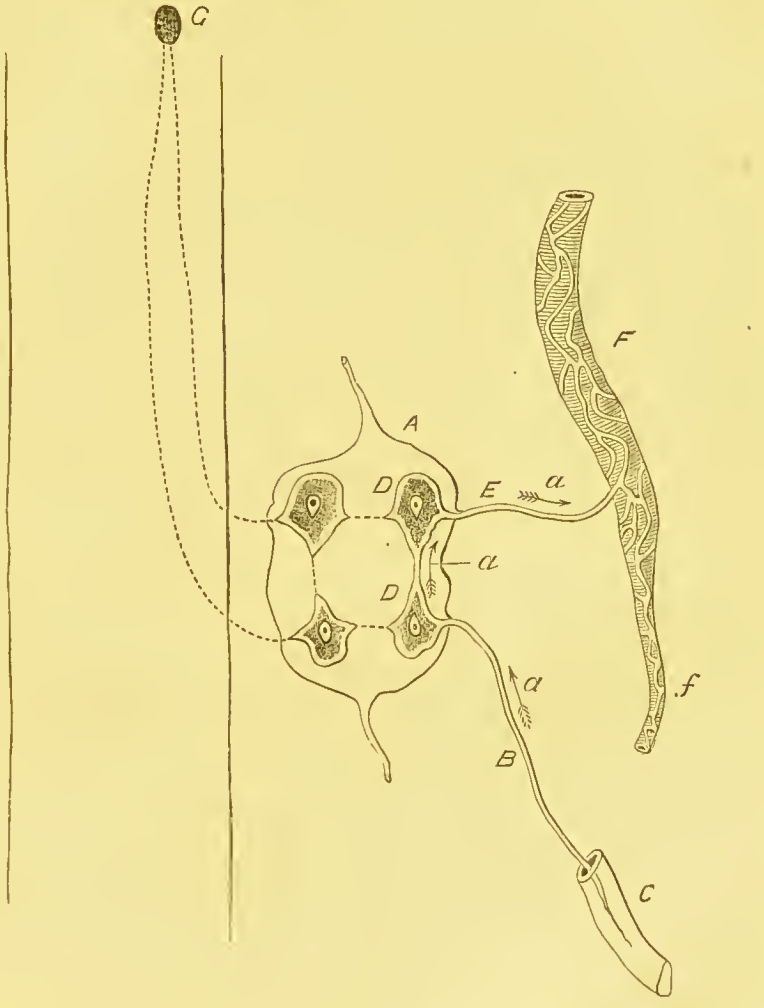
While the foregoing remarks are intended to implicate the sympathetic chain of ganglia in the ordinary function of nutrition, and such modifications of it as imply inflammatory processes, including also those of hypertrophy and atrophy of tissues; there still remains for explanation the dominion of the general vaso-motor centre, which if it should ever be localised, will probably be found to determine the site and regulate the amount of change in vessel calibre resulting from impressions arising directly in the sensorium; of such sort are blushing, and its opposite, blanching of the integument, due to mental emotions, and some states of reverse peristalsis likewise associated with mental disturbance, with others of like kind, which demand no further notice at this time.

The accompanying scheme will illustrate the idea of reflex vaso-motor action as attempted to be explained in the foregoing remarks.

It remains to consider briefly, some of the proofs which appear to me to justify the position now sought to be established, viz., that an excito-vaso-motor function exists between the afferent and efferent elements of a given sympathetic ganglion, and that these latter organs exercise a correlating function, in regard of such operations as

belong to them, between tissue areas often widely separated

FIG. 1.



Schematic representation of reflex vaso-motor action, as indicated in the text:—

A. Single ganglion of sympathetic chain.

B. Afferent fibres from *A* entering sheath of

C. A sensori-motor nerve.

a.a.a. Arrows indicating route of impression conducted to ganglion through *B*, entering the caudate cells *D.D*. and conveyed by them to

E. Efferent fibres proceeding from same ganglion to

F. Artery, and producing dilatation of its calibre.

f. Normal size of artery beyond the influence of the impression.

The dotted lines indicate the course of the fibres, forming the roots of ganglion, in the spinal cord to *G*. general vaso-motor centre.

The inferior cervical ganglion is selected to illustrate this position, because my experience lies largely within the domain of its operations; and because, it being the controlling centre of the circulation of the labyrinth, the phenomena exhibited by alterations in the tension of this organ, whether extrinsic or intrinsic, direct or reflex, are attended with phenomena so striking and pronounced as to admit of no misinterpretation.

The central fact in connection with this subject is one first observed by Drs. Weir Mitchell, Moorhouse and Keen ("Gunshot Wounds, and other Injuries of Nerves," Philadelphia, 1864) to the effect that gunshot wounds of the brachial plexus, whether inflicted in the upper arm or neck, cause the subject of them to fall down, consciousness being sometimes, but not always, momentarily lost. In all, a degree of general weakness amounting almost to collapse is present. The conditions portrayed are most marked where the nerves are crushed or contused, rather than when they are divided; they occur irrespectively of loss of blood, because the vessels escaped injury.

Whatever may prove to be the explanation of this occurrence, it has the value of a vivisection experiment possessing crucial indications.

For its interpretation it is necessary to discover whether corresponding phenomena can be produced by other means, and, if so, to ascertain whether the mechanism involved in the imitated occurrences connects itself in any reasonable way with the lesion first noticed.

An experiment, originating with Weber-Liel, of Berlin, and which any one with sufficient tact may easily repeat—shows that pressing on an exposed stapes through the middle ear, causes the subject to stagger, fall down, and sometimes to lose consciousness. If considerable pressure be exercised, vomiting and general collapse ensue. It is a fact well known to otologists that external syringing, or inflating the middle ear with air—the former by exerting pressure on the ossicles, the latter by the same effect being exercised on the membranes of the fenestræ—are sometimes attended with like results.

Pressure then on, or tension of, the organ of equilibration, which all evidence concurs in locating in the labyrinth, can produce the phenomena of falling and unconsciousness seen to attend contusions of the brachial plexus.

The next point is to determine the association between these regions. This, in brief, is found to reside in the inferior cervical ganglion, fibrillæ from which are connected with the cords of the brachial plexus, whose function is afferent to the ganglion; while other fasciculi from it furnish efferent vaso-motor nerves to the vertebral artery, the latter being the chief source of blood-supply to the labyrinth.

My contention is that the shock resulting from the concussion of the brachial nerves, in gunshot wounds of them, is, so far as their contained sympathetic elements are concerned, propagated first of all to their centre, the inferior cervical ganglion, and thence is reflected as a wave of vessel-dilatation to the vertebral artery. This dilator wave is appreciated first of all in its pheripheral branches, producing an immediate large accession of blood to them. That we are made cognisant of its effect upon the internal auditory branch of the dilated vertebral artery, because it alone is associated with an organ capable of demonstrating its presence by so palpable a feature as the immediate destruction of the equilibrium of the subject. This sudden tension of the intra-labyrinthine fluid, brought about as described, is comparable in degree and in effect to that similar tension seen already to be occasioned by the direct pressure of a probe upon the exposed stapes.

Before accepting definitively this explanation of the phenomenon of falling in gunshot wounds of the brachial plexus, it is necessary to examine whether the effect could be produced through any alternative channel to that above delineated. That the shock is not conveyed by way of the spinal column to some cerebro-spinal centre, is evidenced by many subsidiary facts, which will be developed later on. One negative proof to this effect exists in the absence of evidence that the *centrum cilio-spinale*, located in the zone of the spinal cord, above the level of the second dorsal vertebra (Budge, Waller, Eulenberg and Guttman, &c.), within the limits of which the brachial plexus arises, was in any way implicated in the shock. As is well known, irritations of the cord within these limits—at least such as involve the sympathetic fibres contained therein—produce changes in the size of the pupil, and of the commissure of the eyelids, which were entirely absent in the cases reported by the American authors referred to. Indeed, they distinctly

affirm, "we have seen as yet no such result in wounds involving the plexus." The clearing away of this alternative pathway of impression, by which otherwise it might be conceivable that a hypothetical centre of giddiness, seated somewhere in the medulla, may have been affected and so produced the falling, simplifies the argument, by confining the sphere of operations to the only other medium—viz., that which has been indicated above.

A remarkably suggestive case, No. 21 ("Injuries of Nerves and their Consequences," S. W. Mitchell, M.D., Philadelphia, 1872), affords direct evidence in favour of the course already pointed out. G. A. was shot through the left ulnar nerve, and had at once great *agitation of the heart*, which was for some days his dominant symptom. When it is remembered that the inferior cardiac nerve of this ganglion is an important factor in regulating the heart's action, and that a shock reaching the ganglion from the afferent fibres of the wounded ulnar nerve may be reflected in the ganglion to the inferior cardiac, it is easy to understand how such "agitation of the heart" as happened in this case may be thus brought about. Parallel symptoms of cardiac disturbance are met with all through the series of phenomena traced to lesions of this ganglion, and this when no question of alternative channel can arise, as when the organ itself is proved to be diseased. Indeed, the cardiac symptoms assume such importance in this relationship, that I have been led to assign a conservative reason for linking the organ of equilibration with the heart, through the medium of this ganglion, because it thereby comes to pass that, when the heart is so suddenly and violently disturbed, the labyrinth being likewise exposed to tension, the subject is compelled to fall down, and is perforce placed in a position most favourable to a continuance of the circulation, under circumstances otherwise calculated to bring it to a stand.

These facts, together with others corroborative of them to be shortly detailed, the author regards as possessing a crucial significance. Not only do they correspond with Sanderson's views ("Handbook for the Physiological Laboratory"), to the effect that sympathetic nerves which are associated with sensori-motor nerves, are in afferent relationship with the ganglion with which they communi-

cate, but they further indicate that these *afferent fibres are in reflex relationship with the efferent vaso-motor fasciculi furnished to the arteries from the same ganglion which receives the former.*

It is in this sense that the ganglion is regarded as correlating the areas implicated by both sets of nerves. This fact is of the widest importance, inasmuch as it implies that an excito-motor function appertains to these two elements of the sympathetic system, of quite the same meaning as is that established between sensory and motor nerves of the cerebro-spinal system; with this difference, however, that afferent impressions reflected through the medium of a sympathetic ganglion, take effect upon the walls of the blood-vessels, and by enlarging or contracting their calibre, produce alterations of nutrition or of function in the areas affected by them.

The further evidence adduced to substantiate the foregoing position is gleaned from the phenomena of disease, of accidents, and from such as have been elicited purposely, though with other objects in view. By this means the position in question is subjected to the Baconian rule of varying the circumstances by which a given result is brought about, a principle accepted by J. S. Mill as the first rule of physical inquiry, and the foundation of every other.

Vertigo, as the most prominent symptom, naturally affords strong corroborative proof of the correlating function of the inferior cervical ganglion. Its full discussion will be found elsewhere* and it is evident that this phenomenon when not central in its origin, *i.e.*, when it does not result from the comparatively rare concurrence of grave lesions within the brain, is referable to disturbance, chiefly functional, connected with the areas innervated by the ganglion in question.

The occurrence of *cardiac symptoms, mottling of the hana and forearm*, of certain *Aurœ*, are all discussedin these chapters, and need not occupy us further here, though their anatomical history as delineated, distinctly connects them with the ganglion in question and brings them into the category of proofs supporting the argument.

Passing from these reflex phenomena, we next are con-

* *Vide* "Deafness, Giddiness, and Noises in the Head," 3rd edition.

fronted with a group of analogous symptoms, in which the organ primarily responsible for their production is the ganglion itself. Here the sympathetic centre must be regarded as being in a condition of inherent or acquired defect—*paresis*, that is—so that it permits faulty impressions, usually having the character of deficient inhibition to radiate along the lines of its distribution, and so giving rise to symptoms which correspond to the organs implicated. These are, as before, palpitation, gastralgia, injection of the palmar surfaces, with or without vertigo, as well as some others to be immediately noticed. The subjects exhibiting this complexity of symptoms are chiefly young and, so-called neurotic, females.

A feature of special interest in these patients is that they frequently develope, in addition, a small *goitre* or *bronchocele*. This fact testifies that another efferent vessel-area of the ganglion, and of its congener, the middle cervical, is involved in the process—viz., the vaso-motor nerves of the inferior thyroid artery; from which ensues first, passive congestion, and subsequently hypertrophy of the thyroid body.

But the study of the pathogeny of goitre affords direct evidence of the correctness of the position attempted to be here established—*i.e.* that lesion of the ganglionic centre is directly responsible for the symptoms herein referred to it. Briefly stated, the nature of this evidence is as follows:—1st, a fatal case of exophthalmic goitre reported by Dr. Shingleton Smith of Clifton, in which the autopsy showed that the inferior cervical ganglion had undergone degeneration, and was represented only by a mass of cellular tissue, with a calcified substance for its contents, while the middle and superior ganglia afforded indications of commencing atrophy. 2nd, the fact that goitre frequently dates its commencement from a shock to the general system, which manifests itself in the part of least resistance—this part being the nutritional centres constituted by the cervical ganglia, the defect in which may be usually traced to hereditary influences. One such case I have reported recently in the *Lancet* (The Pathogeny and Treatment of Goitre, March 19, *et seq.*, 1881). In intimate association with this is the fact that the incidence of goitre is occasionally immediately preceded by an attack of vertigo of extreme intensity. A suggestive instance of this sequence—

viz., long-continued exhaustive environment, access of vertigo, commencing enlargement of the thyroid body developing into a fibro-cystic bronchocele enduring over many years—is at present under treatment by my colleague, Dr. Whistler, at the Hospital for Diseases of the Throat.

The category of symptoms referable to paresis of this ganglionic centre includes certain *neuralgias—e.g.*, shoulder-tip pain, neuralgia mammæ and irritable breast, brachial neuralgias and some cervical ones. These conditions have a parallel explanation to the preceding ones, of which they are the frequent companions—that is to say, the neuralgia is due to the dilatation of the vasa-nervorum, the nutrient vessels contained within the nerve-sheaths, and to the pressure thus occasioned to the associated sentient fibres. The *diurnal variations* of such neuralgias are traceable to the recuperation of ganglionic force by rest and food, and its exhaustion by the occupations of life. The former state implies vessel-inhibition from the exercise of the renewed ganglionic energy—the latter, vessel-dilatation, when this energy is exhausted.

Lastly, one other fact of very wide significance is given on the authority of Power (*Practitioner*, 1873). It is that "children destitute of brain and spinal marrow are capable of attaining fœtal maturity, and consequently of maintaining their nutrition at the highest point." In such anencephalous children, it is apparent that, so far as their nutritional development was due to the regulatory influence of nerve centres, these must be referred to the sympathetic system which alone was possessed by them.

The foregoing evidence may probably be deemed sufficient to induce the reader to concede the propositions already affirmed, viz., that we have in the human body a mechanism, that of the sympathetic system, which, when normally constituted and healthily operative, is capable of maintaining the nutrition of the animal man, and that it is designed so to maintain it. That exaggerations or repressions of its normal activities produce those modifications of nutrition which initiate the morbid processes with which my subject is concerned. And lastly, that owing to the correlating function of the ganglia implicated, these processes are localised in the several organs, which exhibit them.

CHAPTER II.

THE ETIOLOGY OF CATARRH, ACUTE AND CHRONIC.

That the Nasal and post Nasal regions are inseparably associated with the Ear, both anatomically and physiologically, is a trite fact in otology. It is not so clearly realised however that diseases of these cavities implicate the auditory apparatus, in such a manner that the latter can only be successfully treated by therapeutic measures directed in the first place to the nose and its adjacent structures.

The recognition of this fact is a comparatively new departure in aural practice. Its importance in this relationship cannot be over estimated. The amount of attention devoted to this aspect of the origin and treatment of ear disease in the following pages, will be commensurate with the author's estimate of its significance.

It is through the medium of Catarrh that ear disease is most frequently initiated. Obviously therefore it becomes a matter of paramount importance to the specialist to acquire a large grasp of the causes which induce Catarrh, as well as to master the consequences to which this all prevalent condition tends.

The Præ-Catarrhal State.

It is matter of common observation that the same individual is affected differently at different times by exposure to similar influences. That is to say, if he to-day experi-

ence a sudden chill, or get a wetting, etc., he escapes unhurt; while an even less degree of exposure to the same ordeal a few months or weeks previously may have given him a sharp cold in the head. Persons of the non-reflective type probably never notice this constantly recurring fact, while those who do dismiss it with the self congratulation that they are not now "*so susceptible*" as they were on the former occasions.

Now, it is precisely the nature of this susceptibility which has to be determined, because by so doing we shall fix the *entity of catarrh*, both in its acute and chronic stages. In order to guard myself against the possible misconstruction of this term, the "entity of catarrh," I would observe that it is not intended to imply by it that an absolutely identical condition pre-exists in catarrhal subjects all the world over; but rather, that a previous state of preparation has been in progress in the economy, which so far as it goes is a departure from the normal state, and that this preparatory stage is of similar type in every instance, its variations being due to personal idiosyncrasies. And further, when the impact arrives between the immediate exciting cause and the already prepared subject, the resulting catarrh is more or less severe, of greater or less persistency, in proportion—not to the intensity of the chill, or whatever the determining influence may have been—but to the degree to which the stage of preparation had advanced prior to this impact.

The condition of susceptibility to take cold implies, therefore, the operation in the system over a longer or shorter period, of certain morbid processes, the combined effect of

which produces the præ-catarrhal state. It is neccessary to examine in what these consist.

For the sake of clearness I may anticipate a part of this enquiry, by indicating that the result of these morbid processes is to store up in the system the products of mal-assimilation and defective elimination ; a state of things which implies congenital, or acquired, defect in the capacity for efficient work on the part of the organs implicated in the processes referred to. That this loss of equipoise in the relationship of alimentation to excretion is really oftentimes inherited, that in fact it is congenital, is supported by the commonly observed occurrence of children in arms who are the subjects of severe catarrh of obstinate duration. As regards functional activities, therefore, it is clear that such children were never fairly started in the struggle for healthy existence. Either the nerve centres which regulate the working power of the organs are at fault, *ab initio* ; or, the organs themselves show certain departures from the normal type.

Without doubt one of the most potent factors of this inherited depreciation of structure of the organs of the body is syphilis. I do not mean to imply by this statement that the immediate progenitors of catarrhally disposed children have been necessarily the subjects of primary syphilis. My contention, however, does not preclude this inference.

Rightly to estimate this influence, it must be remembered that we are dealing with a disease whose effects are not limited to the second generation, but which induces sequences reaching to the third and fourth generations. Like the intermixture of the negro and the Aryan races,

there are phases of syphilitic dilution which, to borrow the language of ethnology, may be spoken of as pertaining to the mulatto, the quadroon and the octoroon type. In these later phases of enthetic heredity, we lose sight of the coarser, more pronounced and therefore readily recognisable indices of the primary dyscrasia, and are confronted instead with such subtle defects—subtle that is so far as the ability to trace their genealogy is concerned, as dry harsh skin; glandular deficiency, as respects capacity for work, whether exhibited in the excretory follicular structures of mucous membrane, in the glands of the lymphatic system, or in the more complicated gland organs of which the liver and kidneys may be taken as representative. Of even graver portent in this category of inherited forces which necessitate defective physiological work is the depreciation of the special nerve centres, the ganglia of the sympathetic, which by the regulatory influence they exert upon the blood vessels, control the functioning capacity of any given organ. The immediate consequences of such impaired sympathetic centres has been already hinted at, (Vid. Introd. Chap).

It implies the inability reflexly to transmit impressions from the tissues to the efferent vaso-motor nerves, so that such vessel areas are liable to passive hyperæmias, the result of persistent vessel dilatation, with its concomitant tendencies to hyperplastic and hypertrophic products. We shall subsequently find in the Nose, and Post-nasal Space abundant evidence of such tissue exaggerations, the result of chronic catarrh of these regions.

Before dismissing this part of my subject it seems neces-

sary in order to avoid misapprehension, to formulate more succinctly the exact inference I desire to draw from the foregoing observations. It is that those subjects who from birth onwards show a repeatedly recurring catarrhal tendency, and in whom hypertrophic changes in the naso-pharynx result from these attacks, there is to be found a disturbance of the equipoise between the functions of nutrition and of excretion, due to a defective working power inherent in the organs primarily concerned in these processes. And further, the possession of a diluted syphilitic taint is a sufficing factor in determining this condition.

If this repressive and deteriorating influence holds good in the instances above referred to, it must apply with equal force to the histological constitution of the cerebral centres. In which case it becomes matter of legitimate speculation, how far, owing to the rates at which we have seen the syphilitic element active in repressing development elsewhere—we may not trace its agency as operating to suppress the intellectual development of the race. It must be admitted as possible, that the cause referred to may be responsible for the absence, or to the comparatively limited diffusion of those delicately constituted brain streaks the possession of which gave us a Shakspeare, a Newton, and in this century a Goethe to redeem the intellectual progress of the human species from the slur of finality. Be this as it may, the further consideration of this subject belongs rather to the domain of the evolutionists, than to the practical scope of this treatise.

Inebriety on the part of the progenitors of such subjects has doubtless similar potentialities. Here indeed we repeat

the preceding argument, for inebriates will probably be recognised as themselves the subjects of inherited or acquired enthetic disease, to the developmental suppressions of which, exercised upon the higher nerve centres, the want of moral inhibition displayed in their special infirmity may be traced.

But the individual thus unfairly started in life has to contend from the outset with gratuitously superadded catarrhal agencies, arising from the *errors of diet* to which he is subjected by the ignorance of his natural guardians, and subsequently by his own disregard of the requirements of his system in the matter of food supplied to it. Again, the *atmospheric and climatic environment* of these latitudes, strains to the utmost the eliminative resources of even sound constitutions, and will be felt with special severity by the catarrhally predisposed in whom the activity of these functions is already handicapped by the circumstances of their birth. In the matter of *Clothing* moreover, the judicious use of which would go far to mitigate the evil effects of climate, there exists an utter indifference to common sense principles, the due observance of which would prevent the initial stages of catarrh, and the wide-reaching consequences oftentimes entailed thereby. These topics will be more fully considered in the chapter on the Hygienic management of the catarrhally predisposed.

Having thus far sketched the inherent conditions of constitution which make for catarrh, there remain to be examined the positive results in the patient's economy of the continued operation of these factors, in order to indicate in what the *premonitory stage of catarrh* actually consists. To

do this exhaustively would lead me too far from my present purpose, inasmuch as it would entail an examination of the normal products of digestion, excretion and assimilation, respecting which moreover the most advanced physiologists are not entirely agreed. The reader is referred to the Lumleian lectures of Dr. Wm. Roberts, 1880, for the most recent information on this subject, and in the following resumé, limited to so much of the issues as concern my purpose, I have made free use of this author's researches.

It will sufficiently indicate the nature of the catarrhal dyscrasia to predicate of it that it consists, mainly, in the formation and storing up in the economy of certain organic acids normally present as the result of digestion, but which are now produced in excess. Thus it appears that while *maltose* and *dextrose* are the præ-assimilable products of the normal digestion of the hydro-carbons starch and sugar, the amylolytic disintegration is exceeded later on, and lactic and butyric acids make their appearance. These acids are also derivable from the disintegration of excess of proteid material, with the addition of urea, during the later stages of pancreatic proteolysis. The maltose and dextrose which are the final products of amylolytic digestion, pass into the liver through the capillaries of the portal vein. In this organ they are rebuilt into higher molecules of glycogen by a process the reverse of that conducted in the mouth and small intestines. This glycogen is presumably held in loose combination with the protoplasm of the hepatic cells. By means of this appropriation by the liver of the products of the digestion of starch and sugar this organ retains a store of glycogen for the use of the tissues, upon which they

can readily draw, while the amount of sugar in the systemic circulation remains a constant minimum under normal conditions, any excess being eliminated by the kidneys.

All this disintegration, partial rehabilitation, and subsequent breakings up of the elementary molecules of the food—many of which have not been referred to above,—take place in virtue of contact with certain ferments present in the respective regions where the changes occur. It appears moreover that these processes are immediately under the control of the vaso-motor system of nerves, and Gamgee intimates that the nerves proceeding to the liver from the inferior cervical and stellate ganglia are preeminent in this respect. (*Human Physiology*, Herman, translated by Gamgee).

It has already been pointed out that catarrhal subjects show by the inferior quality of their digestive work that the organs concerned in these are defectively constituted, a depreciation which applies equally to their vaso-motor centres. It seems probable, that the direction in which the faulty constitution of the organs implicated, indicates itself, is in the highest grade of work they have to perform, viz. the production of those wonderfully constituted ferments, the mere touch of which, like an enchanter's wand, transforms the crude particles of food into assimilable elements.

If this be so—and it seems a reasonable method of explaining the results—it becomes easy to understand how it happens that the amylolytic and proteolytic processes being, in consequence of this defect in the quality or quantity of the ferments, incomplete in the earlier parts of the digestive tracts—considerable quantities of partially digested hydro-

carbons and proteids which are thus incapable of absorption, pass on into the intestinal canal where they undergo further decomposition, aided by bacterial organisms, and break up into lactic and butyric acids and urea. Under circumstances favouring this fermentative process, acetic acid and oxalic acid may be developed in large excess, in addition to the foregoing. Owing to a corresponding defect of functioning capacity in the excretory organs, especially of the skin and kidneys, these acids remain in the system, either free or in feeble combination with bases, in the form of salts more or less soluble.

Now the individual in whom the state of things just depicted has existed for any continuous period will manifest unmistakeable evidences of his condition. These constitute the *symptoms of the premonitory stage of catarrh*. In general terms they may be described as follow :—

The patient feels that he is labouring under a sense of oppression, neither his physical nor mental faculties move with their usual briskness, and he speaks of himself as though he were burdened with a "wet blanket." His temper becomes irritable and uncertain, occasionally breaking out into violent ebullitions of rage, a condition most common in the lithic diathesis; while if the oxalic dyscrasia predominate, he is gloomy and desponding, even to the verge of settled melancholy. His appetite is capricious, his evacuations irregular, his sleep heavy and unrefreshing, often troubled with dreams. Wandering aches and pains make him apprehensive of an approaching illness. All these conditions are aggravated by malt liquors, a fact which need not surprise us, seeing that these contain a

large proportion of sugar derivatives with which he is already over-burdened. His condition is liable to ebbs and flows; perhaps he takes a blue pill and black draught, or some domestic equivalent of these, by which he is temporarily relieved, but usually he continues in this state till the "chill" inevitable in this climate, overtakes him. He now experiences a catarrh, nasal, pharyngeal and aural; perhaps also an attack of quinsey, culminating in suppuration, and in copious urinary deposits.

Here for the moment we must leave him, while in the next chapter we endeavour to determine the exact nature of the new process upon which he has entered, in other words the "mechanism of a chill, or, taking cold."

CHAPTER III.

THE ETIOLOGY OF CATARRH (Continued).
THE MECHANISM OF "TAKING COLD."

A recent writer, Dr. Bosworth of New York, speaking on this subject, says "if we ask ourselves what especial influences produce the morbid changes which we call taking cold, or what is the true relation between the recognised cause and observed effect, we find it somewhat difficult to give a correct answer to the question." The considerations which have already occupied our attention respecting the antecedent stage of catarrh, will have served the purpose of clearing up a portion of the difficulty referred to in the above quotation, and will prepare the way for what remains to be said on the mechanism of taking cold.

The following explanation of this process is the immediate outcome of the physiological views on the sympathetic system, given in detail in the preceding chapters. The question now before us, is to ascertain how the apparatus therein described, is called into play by the chill, and to study the nature of the reactions consequent thereon.

The ordinary conditions of a chill imply that some portion of the body be exposed to a current of air, colder and moister than that of the average surrounding atmosphere, and that this exposure be prolonged for a considerable period. In this way the surface temperature is lowered generally, or some part of it only is thus reduced below the normal stand point. Frequently the lower extremities re-

ceive the full force of this shock, from the common habit of standing in damp shoes on a cold pavement, &c. Or, it is the neck and shoulders upon which the draught exhausts its virulence. In either case, this prolonged lowering of the temperature, or abstraction of heat, is appreciated as a shock, by the peripheral sympathetic nerves of the skin which receive it. These being, as already shown, afferent in their conductive function, convey the impression to their respective ganglia.

Obviously, a difficulty obtrudes itself at this point, which may be illustrated thus :—A patient has been chilled in the feet and lower limbs, yet his "cold" shows itself in the "head." How does this happen? seeing that the lumbar ganglia will be the first to receive the impression, and on the hypothesis put forward, the reflex action should take effect upon the efferent vessel nerves issuing from these; in which case we should expect an attack of lumbago or sciatica, whereas we have cold in the head and sore throat. Now it appears to me, after mature consideration, that the true explanation of this phenomenon resides in the fact of the varying degrees of *mobility*, or readiness to respond reflexly to impressions, which characterise the respective ganglia of the sympathetic chain. These, it will be remembered, are connected in the vertical direction by two cords above and below, by means of which each subcentre is connected with its fellows. Such a violent impression, as above represented, reaching the first ganglion of the series, and not meeting there with a ready outlet in the direction of its efferent nerves, passes upwards, trying each in turn, until one is found which responds to the im-

pression, by its readiness to take on reflex action in an efferent direction. Such a weak centre is the part of least resistance, in this patient's economy: or, more correctly speaking, the vessel areas over which the vaso-motor (efferent) nerves of this ganglion exercise their function, are the parts of least resistance.

That the ganglia of the cervical region are usually of this responsive kind, will be apparent for many reasons. These are concerned with more delicate organs, whose functions are more varied and complex, perhaps, than those of other regions; such are the organs of sight, hearing, smell, speech, taste, deglutition, also the first portions of the respiratory tract, and important cardiac functions. Therefore, the ganglia presiding over the nutrition of these areas, are probably innately more sensitive to impressions, and more readily respond to them, than do others. This is one reason, and pertains to their inherent constitution. But there is another reason, viz., these ganglia are more liable to abuse from the effects of smoking, alcoholic drinking, &c., and such weakened ganglia are apt to have their deterioration imparted by parents to their offspring.

But though the initial impression of a chill excites its supremest reflex influence over the vessel area of the weakest ganglia of the series, there is very clear evidence in the phenomena of a "cold" that the lower, through which it traversed in its ascensive course, do all of them exhibit more or less of reflex response, which is manifest in a disturbance of the vessel equilibrium pertaining to the vessel domain of each in succession. For, is it not often the case that the subject of a chill, from the multiplicity of his aches

and pains, feels uncertain as to where the real irruption will take place? Thus, while he sneezes one minute, his loins and limbs ache and twinge. Sometimes he coughs, and again every turn of his neck gives him pain. Even after all these premonitory symptoms have given place to a nasal flux, will he not invariably say he feels as if "he had been beaten all over"?

In order to understand these commonplace occurrences, let me first attempt to enforce the notion I wish to convey, of the behaviour of the sympathetic ganglia under the influence of a chill, by an illustration. For this purpose I will liken the sympathetic system (in this aspect of its relationships) to a long metal pipe. The situation of the ganglia is marked on this pipe by lateral perforations communicating with its lumen. All the normally resistant ganglia have very small holes, mere pinholes; while the weaker ones, *i.e.*, those of least resistance, are indicated by larger orifices, say, of the size of peas. These latter are placed in order, one beyond the other, at the distal or far end of the tube: they are four in number to represent the stellate and three cervical ganglia; the last corresponding to the upper cervical, as the weakest of the series is denoted by a broad slit. We will suppose the far end of the tube to be closed. For the purpose of this illustration, I will represent the shock of the "chill" as traversing this system by means of a stream of water injected into the near end of the tube. A feeble spray will issue from the small holes in succession as the current reaches them, but a large stream will issue from the big holes at the farther end. These will soon exhaust the supply of fluid, the streams

from the smaller ones diminishing in proportion to the flow from the larger perforations.

I am aware that this explanation possesses the defects inherent in every attempt at comparison between the complex operations of a physiological process and a simple mechanical arrangement, such as that just sketched. It may, however, aid the purpose for which it is intended, and in order to extend the conception to a wider range of cases than that instanced, we will admit the possibility of the shock, represented by the stream of water, entering at any given point of the tube, passing along it in both directions and finding an exit as before.

The next step in this investigation, concerns the consequences of the transference of the shock from the ganglia in an efferent direction, *i.e.*, along the vaso-motor nerves, to the muscular coats of the arteries. The totality of evidence goes to show, that the immediate effect of such a reflex impression, is to cause contraction of the vessels. This is of very short duration, it is rapidly followed by one of prolonged dilatation ; the effect being most manifest in the peripheral portions of the circulation, *i.e.*, the arterioles and capillaries of the particular vessels implicated. This fact reduces the area where symptoms are exhibited, to considerably smaller dimensions than would otherwise be the case, leading us to look for these in a limited number of tissues. It is matter of observation furthermore, that some efferent nerves of a given ganglion, are more prone to carry off the impression than others, perhaps from having already been the scene of a similar irruption, or from an inherent weakness of the ganglionic cells, which regulate

the action of these particular nerves. Again some structures as muscle, areolar tissue, &c., are so undemonstrative of the presence of hyperæmia, either by sensations appreciable to the patient, or to the physician by the display of objective states, that they will usually escape notice in the summary of symptoms attending the stage of vessel dilatation. It comes to pass therefore, that when we have to observe these phenomena in the sphere of the superior cervical ganglia, they will be discernible chiefly in those vessels which ramify in tissues having a free surface, as mucous membrane. Again, when the physiological stage of effusion succeeds that of dilatation, the effusion takes the form of excess of secretion in localities in which the "water-shed" so to speak, causes the streams to flow where they cannot escape detection.

As already intimated, the phenomena of catarrh implicate mainly the vessel areas of the superior cervical ganglia, a rapid anatomical survey of which, will aid our present purpose. This survey, for reasons which will be immediately apparent, need not extend beyond the efferent nerves derived from the third and fourth segments of the subcentre, which under the designation of *nervi molles* are distributed to the trunk of the common carotid artery and its branches. It is to be regretted, that minute anatomy leaves much to be supplied as regards the exact distribution of the vaso-motor nerves generally. When their *value* in determining the localisation of morbid phenomena comes to be more fully recognized, these gaps will doubtless be supplied. Limiting the following remarks to the vessel areas which are concerned in catarrhal symptoms, this

generalisation may with safety be affirmed; viz., that although the *nervi molles* are distributed to the trunk of the common carotid, and most of the branches of the external carotid, they have very little to do with the regulation of the blood supply of any part of the arterial system after it enters the cranium. The importance of this fact in its full significance will appear in the sequel. In justification of the statement just made, it will suffice to recall the facts, that the *vertebral arteries* which convey by far the larger part of the blood to the middle and posterior portions of the brain and medulla oblongata, have a totally distinct nerve supply, viz., from the inferior cervical ganglia. Again, the *middle meningeal* which is an intra-cranial vessel of importance, is dependent upon derivatives from the otic ganglion, as it approaches the cranium. And lastly, the *internal carotid*, though it receives a plexus from the first or highest segment of the superior cervical ganglion, and therefore might be supposed to be involved in impressions reaching it reflexly, yet the balance of considerations seems to point to the fact, that unless these be of a more violent character than are usually concerned in the production of catarrhal phenomena, this vessel usually escapes the effect of such reflex impressions as we are considering, for the reason that they tend to exhaust themselves through the channels of earlier access afforded by the *nervi molles*.

Hence it will be obvious that the mechanism of the vaso-motor system of the superior cervical ganglion in its reflex relationships, is so arranged, that the intra-cranial circulation is exempted from the frequently recurring centripetal impressions reaching it, a more ready outlet for

which is provided in the direction of organs of less relative importance than the brain. This fact which is worthy of note, as pertaining to the many conservative arrangements of the economy, has besides valuable diagnostic and therapeutic bearings. It explains why disturbance of the sensorium is usually absent in catarrhs, and it will shortly be evident that the frontal and occipital headaches occurring therein, are not structurally speaking in any sense central in their seat. Therefore their incidence need not alarm us, nor do they demand very zealous therapeutic interference.

Passing from these preliminary observations to examine the course pursued by the vessels receiving their efferent nerves from the source (lower segments of superior ganglia) reflexly implicated in the exciting (catarrhal) impressions, we shall find them as stated in the following table; and tracing them as is attempted to be therein done to their peripheral destinations, their collective manifestations of dilatation will afford a fair picture of an irruption of ordinary catarrh. I have grouped them in the order of their anatomical origin, and placed against each the particular symptom to which it will give rise under the influence of the dilator wave.

Vessels Innervated by Nervi Molles.	Catarrhal Symptoms due to their Reflex Dilatation.
1. *Superior Thyroid*:—Larynx . .	Laryngitis.
2. *Lingual*:—Tongue	Modifications of taste.
3. *Facial*:	
(a) Branches to Palate and Tonsils	Sore throat; Tonsillitis.

(b) Branches to Masseter and Buccinator	Stiffness of jaws.
(c) Coronary:—Lips and Alæ nasi .	Herpes.
(d) Lateral Nasal:—sides of nose .	Herpes occasionally.
(e) Angular (joining Ophthalmic) .	Assists in producing Ophthalmia.
4. *Occipital:*	
(a) Branches to muscles of neck .	Stiff neck.
(b) Branches to scalp . . .	Some forms of occipital headache.
5. *Posterior Auricular:*	
(a) Stylo-mastoid supplies twigs to middle ear; to mastoid cells; and to Membrana Tympani . Some also enter Labyrinth.*	Acute Otitis Media.
6. *Temporal:*	
(a) Branches to articulation of jaw and to Masseter muscle . .	Stiffness and pain in moving jaw.
(b) Anterior Temporal: forehead .	Frontal headache.
(c) Transverse Facial: parotid gland	Inflammation of Parotid.
7. *Internal Maxillary:*	
(a) Tympanic branch (entering Tympanum through Glaserian fissure reaches Membrana Tympani and joins Stylo-mastoid and Vidian) . .	Acute Otitis Media.
(b) Middle Meningeal (in great measure exempted as it receives its vaso-motor nerve supply through the Otic ganglion): Branches from it enter Tympanum through Hiatus Fallopii and join the Stylo-mastoid artery	Acute Otitis Media.

* This fact announced recently as a new discovery was described in Quain's Anatomy, 1856.

(c) Inferior Dental: teeth and gums of lower jaw	Aching of teeth of lower jaw and feeling as if they were elevated.
(d) Alveolar: teeth and gums of upper jaw and Antrum of Highmore	Aching of upper jaw, and aching of cheek bones.
(e) Infra-orbital: lachrymal gland, front teeth, lachrymal sac, and inner angle of orbit . .	Flow of tears; Ophthalmia.
(f) Descending Palatine: gums and mucous membrane of palate .	Oro-pharyngeal catarrh.
(g) Vidian: enters Vidian canal and supplies Eustachian tube, Tympanum, and vault of Pharynx	Eustachian catarrh; Otitis Media
(h) Pterygo-palatine: supplies the same structures . . .	Ditto.
(k) Spheno-palatine: enters back of nose, and ramifies in Spongy bones, Septum nasi, and the Sphenoidal and Posterior Ethmoidal cells	Rhinitis, nasal catarrh, headache and face-ache.
8. *Ascending Pharyngeal*, runs upwards close to pharynx, supplying Constrictor muscles, Eustachian tube, Tonsils, Arches of Palate, as well as the Superior Cervical ganglion and nerves issuing from base of skull, etc.	Sore throat, Tonsillitis, Pharyngeal catarrh, and inflammation of the middle ear.

The collective manifestation of the symptoms detailed in the second column of the foregoing table, furnishes the phenomena met with in a severe case of typical catarrh, or cold in the head. The vessel medium, by the agency of

which each particular region is implicated, is shown in the first column, while the vaso-motor nerves regulating the calibre of these, have been traced to the *nervi molles* having a common origin in the lower segments of the superior cervical ganglion. It is true that every ordinary cold does not of necessity involve all the regions indicated, an exemption which may depend upon various circumstances, but is mainly due to the point to which the præ-catarrhal stage has advanced prior to the impact of the exciting shock. The intensity of the chill becomes of greater importance in subjects who have experienced only a slight degree of preparation, and in these the symptoms though severe at first, tend rapidly towards resolution, the reason of which will be shortly apparent.

I wish here to emphasise one or two inferences from the preceding anatomical study, because of the light they throw on the subject now under review; and because, if my line of argument be correct, they have a range of applicability co-equal with the occurrence of similar symptoms in other regions: These are as follows:—

a. It is not by continuity of tissue that catarrhal symptoms spread to contiguous regions, but because the vessels of such adjacent textures derive their nervi vasorum from a centre (ganglion) identical with that which mediates in a similar way the region primarily affected.

b. The next inference stands somewhat in the position of a corollary of the preceding one. It is to the effect, that if we would ascertain what tissues or regions are likely to be involved in such reflex sympathetic impressions as we are considering, it is necessary to determine—not the course

of the vessels continuous with those primarily implicated—*but what is the distribution, as regards any vessels, of the efferent nerves proceeding from the ganglion which mediates the vessels already recognised as manifesting by their behaviour the presence of the original impression.* For, it is only in this way that we can explain the fact, that organs adjoining one which is the scene of morbid action, and having the same blood supply, are often sharply defined from these by their freedom from any such pathological change. On the other hand some distant region having no apparent association with that primarily affected, is really brought into an analogous morbid state. Such an occurrence exemplifies the correlating functions of the ganglia, and has already been insisted upon.

The occurrence of *herpes labialis* in the course of a common cold is instructive, and inasmuch as it will not again demand our attention, may be considered at this point. It is occasioned thus :—Coincidently with the evidence of vessel distension in the regions of the turbinated bones, pharyngeal mucous membrane, palate, &c., a similar dilated state of the coronary arteries will be present. Bearing in mind the tendency of such change in the calibre of the vessels to exhibit itself in the peripheral twigs of the vessel, this is seen as regards the coronary arteries, to happen in one or more of the terminal branches whose destination is in the delicate skin forming the boundary between the lips and the integument of the face. The stage of simple dilatation is indicated at this spot by a papular elevation of the cuticle, which being shortly succeeded by effusion, the cuticle is still further raised and

distended with serum, as indicated by a group of vesicles. These by reason of their juxtaposition generally merge into one another, so that the appearance of a small bulla is imparted to the affected spot. By the time this stage is reached the original impression is exhausted, the tonus of the vessels is restored, the effused fluid dries up, and the process concludes with desquammation of the disturbed patch of cuticle.

The foregoing picture of the phenomena induced by the dilator wave in a patch of integument, exactly records, *mutatis mutandis*, what takes place when mucous membrane is involved in the same process. That is to say, there is first vessel distension occasioning swelling and dryness of the epithelial covering, then effusion of serum which escapes from the free surface, carrying with it the mucus also formed in excess in the follicular structures of the membrane; and later, also, the discarded epithelium cells from their different strata, in varying stages of growth and degeneration. This mixture of serum, mucus and cells, constitutes the flux of an ordinary catarrh, which under favourable circumstances rapidly ends in resolution; that is, in the restoration of vessel tonus, and consequent cessation of symptoms.

It is necessary to repeat that the foregoing rôle of symptoms applies only to simple catarrh, where the preparatory stage is not greatly pronounced, and where the subject is not specially predisposed to catarrh by the operation of those hereditary or acquired influences already detailed. Before entering upon the conditions which determine the chronicity of the affection, it will be

desirable to glance rapidly at some of the more widely diffused symptoms which usually attend the attack, and so complete the sketch of the mechanism of acute catarrh.

Allusion has already been made to the distribution generally, over the body, of wandering aches and pains, and which may become so pronounced in the lumbar and sciatic regions, that the catarrhal symptoms proper are comparatively unnoticed in presence of the more acute anguish occasioned by the sciatica and lumbago. The subjects thus affected are usually of the rheumatic diathesis, their præ-catarrhal stage having partaken of the character of defective digestion of the proteinous elements of food, and the equally defective elimination of the effete derivatives of these, as well as of such azotised elements as proceed from the wear and tear of the tissues. Thus the predominant vice of these patients' systems leads to the accumulation of the *salts of uric acid;* lactic acid may be present also, being derived from proteids through leucin, and probably some other acids. Dr. Garrod, in the Lumleian Lectures on "Uric acid, its physiology," &c., published while these pages were in the press, argues that uric acid as such, is formed only in the kidneys. Should further research substantiate this inference, it will serve to fortify my position, that an hereditarily defective kidney—taking this to illustrate the mode in which such inherently deteriorated organs exercise a pernicious influence on the economy in the direction of predisposition to catarrh—will favour the accumulation in the system of those penultimate compounds of uric acid which present themselves for final metabolism in the renal organs. The incapacity

to accomplish this last stage of elimination tends to throw the urates back into the system, where their presence in time establishes the condition known as the lithic diathesis, regarded in this work as one phase of the præ-catarrhal state. The irritating character of the nasal flux, contact with which, in some cases, causes the integument of the meatus and upper lip to become excoriated, is doubtless due to the presence of substances derived from the foregoing source, dissolved in the serum effused during the catarrhal process—though its exact nature does not appear to have been investigated.

An important feature about these mal-proteidising subjects, is that their catarrhs are prone to affect the region of the fauces rather than the nasal cavities, the brunt of the irruption in this locality falling upon the tonsils which become the scene of a suppurating inflammation, ordinarily known as quinsey. Therefore, it is not unusual to find the subjects of this type of catarrh, manifesting all the following symptoms: Pain in the extremities, upper and lower, with a tendency to concentrate in the localities to which the lumbar and sciatic nerves are distributed; some nasal catarrh; inflammation of the fauces, rapidly focussing into acute tonsillitis, ending in suppuration.

Such a patient is to be regarded as in a state of very imminent peril, not so much because he exhibits an early stage of rheumatic fever, as because, unless he is very carefully managed, he will develope a cardiac inflammation; nay, I may go further and affirm that a very slight *mis*-management will *compel* him to develope a carditis. When I have succeeded in establishing this position, it will be

seen that these neuralgias are really salutary warnings—acute pain being frequently nature's method of calling attention to imminent perils, insidiously working towards lethal issues.

Inasmuch as this position rests upon the principle of the correlating function of the sympathetic ganglia, I must, for the purpose of demonstrating it, recall the illustration made use of above to explain the behaviour of these ganglia under the influence of a chill, when the sympathetic system as a whole was compared to a pipe perforated at intervals to represent the efferent outlets of the initial or dilator wave. This latter, it will be remembered, was represented as issuing from each ganglion, or orifice, in succession, in its course up the series; the dilator influence being exerted on the vessel areas supplied by each ganglion with vaso-motor nerves. This, for reasons then explained, is more marked in some and much less in others. The vessels so influenced will induce no objective results if the tissues to which they proceed, are not calculated to elicit such symptoms. But it is obvious that all the arteries which enter nerve trunks containing sensory fibres (such *e.g.* as the spinal nerves) are so circumstanced, as at once to give notice of their distension. These *vasa nervorum*, the nutrient vessels of the nerves, when distended must compress the fasciculi contained within the unyielding nerve sheath. As effusion succeeds distension, this compression will be more severe and will disappear more slowly, but however transient it will crowd upon and squeeze the sensitive fibrillæ, and will thus give rise to pain. This I submit is the true explanation of acute

neuralgia occurring under the circumstances pourtrayed. It is in the first instance a mechanical jugulation of the contained fibrillæ, expressing itself as has been stated, primarily by pain, but constantly interfering with all the reflex motor functions of the nerve also. Of such sort are localised anæsthesias, sensations of formication, pins and needles, tingling, &c., in some part of the limb supplied by the spinal nerve; as well as a quasi-paralysis of motion of the limb. All these conditions may be met with in sciatica; and may be erroneously, as I venture to think, referred to lesions of the spinal cord. Reflex pareses are of the nature now pointed out, and may be verified in numerous instances. Paresis (gaping) of the vocal cords in laryngeal catarrh affords a good example of the kind.

When the stage of effusion into the sheath is reached, the transuded serum will carry with it whatever soluble matter it may contain, and this being in the case before us an organic acid, either free or in feeble union with a base, a further source of irritation to the adjacent nerve-fibres is thereby added. It will shortly be indicated in what way the presence of an acid environment tends to maintain the existing dilatation of the arterioles, and so affords one element of persistency of the symptoms. But it may happen that the more solid constituents of the blood will escape also, and a clot or diffused ecchymosis be located within the nerve sheath, just as in fact blood is sometimes effused into the vesicles of herpes. Any solid matter—whether clot, or a crystallisable chemical compound—will be left behind more or less, after the acute process has subsided, forming an additional reason for the maintenance of pain occasioned by its presence.

In view of this explanation, the incidence of lumbar or sciatic neuralgia will be expected, as the outcome of the reflex action of the lower ganglia of the series which are first visited by the surface impression arising out of the chill. In like manner the intercostal and brachial nerves will succumb in response to the ascensive progress of the wave, so that we are now in a position to understand why under these circumstances the entire body aches with pain.

When at length the more mobile ganglia of the cervical region—indicated in the supposititious pipe by larger perforations—are reached, the reflex dilator wave becomes more pronounced. This is the area of least resistance, and exhibits therefore the largest display of tissue disturbance. This, as I have said, is usually the tonsils and adjacent fauces. As the vessel areas herein implicated carry off the full force of the wave, those primarily affected gradually subside, equilibrium of vessels is restored where it had suffered the disturbance of *dilatation only*, an exception the meaning of which will be immediately apparent—while the patients' symptoms are concentrated in his throat.

It is patent to every observer that however acute the inflammation may be in the nose and adjacent regions, causing the discharges to assume a purulent or muco-purulent character, there is seldom any tendency for these to collect in the tissues in the form of an abscess, whereas a corresponding degree of the same process in the tonsils very generally culminates in this issue. The reason of this resides in the fact that the latter are parenchymatous

organs, a circumstance which promotes the retention of the exuded fluid, while in the case of the Schneiderian membrane, there is so little depth of tissue that the tendency is rather for the effusion to escape as a flux from the mucous surface. Now the *retention* of an effusion occurring under the circumstances we are dealing with, has a paramount influence on the subsequent steps of the morbid process. It involves the following fact in pathological physiology, for which we are indebted to the labours of Dr. Gaskell, who communicated it at the meeting of the British Medical Association, held in Cambridge in 1880. It is to the effect, that when an irritated tissue (the objective state of irritation being the hyperæmic condition of its arterioles) is bathed in an acid fluid, the presence of the latter tends to keep up the dilatation of the blood vessels; while on the other hand, if the effused fluid be alkaline, an opposite effect occurs, viz., contraction of the arterioles. It may be premature to deduce dogmatic inferences from Dr. Gaskell's researches as regards their applicability to inflammatory processes generally, but there appears to me to exist much indirect evidence in support of their correctness. It is clear, however, that such a process of vessel dilatation followed by effusion of acid fluid, such as the patient's præ-catarrhal stage implies, occurring in an encapsuled organ like the tonsils, will afford the conditions described by Gaskell as necessitating a prolongation of the physical state of vessel dilatation. Any considerable distension continued for a sufficient period entails the escape of leucocytes, or corpuscular elements of the blood, through the walls of the vessels. These cells after undergoing a

certain degree of development, and inciting a corresponding activity in those of the adjacent connective tissue, suffer fatty degeneration and die. In other words an acute purulent process is set up affording all the phenomena of an abscess.

The way is now cleared to permit of an explanation of the statement already insisted upon, viz., that the mismanagement of a quinsey may compel the supervention of a peri- or endo- carditis. If the co-ordinating or correlating function of the sympathetic ganglia be recalled, and also the fact that the reflex efferent impression in the case under review, has found an outlet in the direction of the *nervi-molles* and the arteries they regulate; and if moreover it is remembered that an important sympathetic nerve of the heart, the superior cardiac, proceeds from the ganglion in close proximity to the former fasciculi, it is easy to see that suppression of the wave along the comparatively harmless tract of vessels to the throat, will at once cause it to be deflected along some other channel, and that this may be, and very likely will be, that of the adjacent superior cardiac nerve. The relations of this nerve to the superior coronary plexus show, that whatever special functions it may possess, it participates in the governance of the intrinsic circulation of the heart, and is therefore capable of influencing the trophic processes taking place in this organ. Experience tells us that cardiac inflammation is apt to supervene upon tonsillar inflammation, a *metastasis* being said to occur under these circumstances. The explanation I have offered above is consistent with the facts, with the analysis of other so-called "metastases," and it

fits in with the hypothesis. I submit it therefore as an improvement on the use of a Greek term, which however convenient for indicating an occurrence, serves nothing towards explaining it.

It will be unnecessary to examine further into the steps of the morbid processes under review if what has been stated suffices to establish the positions insisted upon: viz., the existence and nature of a præ-catarrhal stage; the mechanism of the chill, implying vessel dilatation in the parts of least resistance, in response to an afferent impression reflexly transferred to this efferent area; and the tendency of the chemical qualities of the consequent effusion to determine the issues of the inflammation thus brought about.

CHAPTER IV.

CHRONIC OR POST NASAL CATARRH, AND ITS SEQUENCES.

RETURNING now to our catarrhal patient, as we left him at the close of the 2nd chapter, in the throes of an acute illness, the outcome of the impact of a chill upon his inherited and acquired proclivities, we shall find him upon recovery, relieved of the oppression under which he had laboured previously to the attack, and feeling in nearly all respects that he is himself again. It is necessary however not to overlook the fact, that the crisis which cleared his system of its poison, was accomplished at a price which entailed the death of a portion of his tissues. Nothwithstanding this, the fact remains, that rarely is he quite the same as previously. A post nasal catarrh persists, which for months and perhaps years annoys him with trouble in his throat, especially in the morning. This shows itself by hawking and coughing when he rises, accompanied with the expulsion of a little tenacious mucus, the efforts to get rid of which often end in retching and even in vomiting. His throat at the same time, feels stiff and wooden, the result of relaxation of the pharynx, especially if he have indulged in an extra pipe or cigar over night. He is also prone to have a sensation, as if a hair were entangled near the root of the tongue, a subjective sensation occasioned by the presence of inflamed and swollen follicles on the posterior wall of the pharynx.

All these symptoms grow less after breakfast, and soon the engagements of business cause him to forget the troubles attending his toilet. It is true that he is not without other reminders during the day—a change of temperature, as from the office to the street. induces sneezing and running at the nose; and at night, especially if he indulge in the common habit of taking a so-called "night-cap" in the shape of hot and sweetened spirits and water, his sleep will be disturbed, he cannot breathe freely through his nose, and when he wakes he hears unwonted noises in his ears. The last named symptoms indicate a persistency of the loss of vessel tonus, the direct legacy of the initial vaso-motor disturbance. A comparatively slight addition to the as yet imperfectly restored balance of vessel innervation in the area of recent disturbance, such as just indicated, suffices to withdraw it for the time, and to allow the recently affected vessel areas to dilate under the mechanical influence of the recumbent posture. Under these circumstances the mucus membrane of the inferior turbinated bones swells up and prevents nasal respiration, while Eustachian ventilation is similarly impeded.

With the return of summer and a seaside visit, all these symptoms diminish. But their subject neglectful of former experiences, returns to his old life; eating, drinking, smoking, working, too much, and the first fogs of autumn recall his former ills. Usually it is not longer than two years, often much sooner, that he will be found in the state of malaise, oppression, and general distress in which we first encountered him. Although in the interval he may have experienced various chills, these have troubled him

but little. But he is now again fairly charged with the debris of his defective alimentary work, and the explosion when it recurs, repeats the former rôle—nasal and pharyngeal catarrh, and probably, instead of tonsillitis, he this time has laryngitis, and an illness of two or three weeks duration. Recovery is slower and more incomplete than on the former occasion.

Supposing the patient to be of the veritable catarrhal type, he will be apt to pass into a state of great discomfort not to say of misery, while some symptoms will arise from time to time calculated to excite the gravest apprehension. Thus, after the usual clearing up of mucus on rising, it will be observed that some portion of the sputum is tinged with blood. This symptom happening in the wake of what the patient believes to have been a bronchial cough, excites in his mind the fear that his lungs are implicated. In reality it is of trivial import, signifying merely that a distended follicle has been ruptured by the rasping and convulsive action of the fauces, accompanying the efforts to get rid of the secretions collected in the post-nasal regions during the night. It is not rare for such cases to be submitted to long courses of treatment, to ward off phthisis, while the region really affected is ignored altogether. Recourse to posterior rhinoscopy should differentiate these symptoms by enabling the observer to recognise their true objective cause.

Concurrently with the continuance of these throat symptoms, there will be developed others referable to more distant organs. I have already alluded to the *tinnitus* with which the patient was occasionally troubled in his early

attacks of acute catarrh, and referred it to the implication of the Eustachian tubes in the inflammatory process taking place in the naso-pharyngeal mucous tract. This surging or tidal tinnitus is in these first attacks, usually of short duration, and subsides of itself. But on the repetition of the causes that induced it, and the subsequent persistent trouble in the post-nasal space, the catarrhal condition of the tubes extends to the middle chamber of the ear, and there is added to the patient's other troubles, that of a commencing *Deafness.* It is important to notice moreover that a particular change in the relationships of the sound conducting apparatus, due to the catarrhally induced obstruction of the tubes, attends this condition and exerts a marked influence on the induction of the next symptom, the so-called *stomachic vertigo,* The nature of this change is that a retraction of the drum-membrane ensues, in consequence of the external atmospheric pressure not being counter-balanced by the column of air behind it, which should be constantly renewed by the automatic action of the Eustachian tubes upon the respired air. This function being in abeyance the air is excluded from the tympanic cavity, and hence the greater or less degree of collapse of the drum-heads. With this the ossicles are also pressed inwards, and through the medium of the stapes exert a slightly increased degree of tension upon the intra-labyrinthine fluid, which as will be more fully shown in treating of giddiness, constitutes a predisposing cause of Vertigo. Now the subjects of chronic catarrh are particularly prone to attacks of vertigo, which attacks are frequently initiated in the *primæ viæ.*

After what has been stated in the preceding chapters respecting the pre-catarrhal state it will be clear that maldigestion is a common concomitant of it. It was therein shown that oxalic acid is one of the many products of this defect, which irritate the digestive organs, and tend by their presence to incite reflex vaso-motor phenomena. As this subject will be fully considered later on, it is only alluded to here for the sake of emphasizing the fact, that *oxaluria* is a common condition in the subjects of chronic catarrh. On this point I can speak distinctly having seldom failed to discover crystals of oxalate of lime in the urine of patients who have recently become vertiginous and who have at the same time been labouring under the catarrhal dyscrasia.

CHAPTER V.

THE HYGIENIC MANAGEMENT OF THE CATARRHALLY PREDISPOSED.

Before entering upon the examination of the local effects of chronic catarrh in the regions where it chiefly manifests itself, it may be of service briefly to indicate certain details of domestic hygiene, the observance of which will prove efficient in warding off from the catarrhally disposed subject, those incidences of his constitutional proclivities, the early stages of which have been reviewed in the preceding chapters.

The *Morning Bath* takes precedence, not only in the order of its occurrence in the daily routine, but in respect of its importance; for experience will confirm the statement that the injudicious use of "cold tubbing" is a pregnant source of evil to many constitutions, and to none is it more so than to those of the catarrhal type. The particular kind of bath I recommend for these, although it can lay no claim to novelty is by no means so widely known or adopted, as it deserves to be. It is essentially a *soap bath.* The requisites for its due performance are first, a small sponging bath, containing warm water, to a depth of 3 or 4 inches: in this the bather stands, his feet being thus immersed and kept warm through the entire process. The 2nd portion consists in a large hand basin placed on a stand at a convenient height to be readily reached by the bather. This is filled with cold or just chilled water in

which a large sponge is soaked; it is so placed that the stand which supports the basin is close to the outer rim of the bath containing the warm water.

Everything being thus prepared the bather steps into the hot water, and rapidly wets the entire surface of the body with the sponge lightly wrung out of the cold water. He now rubs the skin all over with a piece of good yellow soap, which the previous wetting allows him to do with facility. Next he proceeds to rub the soap well into the skin until he is suffused with a lather. Then dipping the sponge into the nearly cold water he squeezes it on the shoulders and chest until the body is rinsed free of soap. This accomplished he envelopes himself in a large sheet or bath towel, and hastens to dry himself, while still standing in the warm water, which he only leaves when he has invested himself in his first garment; after which he proceeds to dry his feet thoroughly.

The above operation only occupies a few minutes. If the subject be in delicate health, or the weather be cold, the bathing should be done before a fire, but under ordinary circumstances this is not necessary.

The essential points in this bath are that the bather's feet never get chilled, which is important for subjects the circulation of whose extremities is at the best but feeble. The brisk friction of the skin with soap not only stimulates it to healthy action, but the introduction of an alkali serves to neutralise the acid secretions with which the skin is permeated. It has the further advantage of dissolving and removing the epithelial plugs from the excretory gland ducts, and hence facilitates their action as emunctory or-

gans of prime import, in relation to the special difficulties with which these subjects have to contend.

As regards *Sea-Bathing*, respecting the advisability of which in a given case the opinion of the Aural Surgeon will be often required, the following observations may be of use. It is matter of fact that many patients date the commencement of their ear troubles from a sea-bath, and indeed the probabilities of this being so will not seem surprising when the ordinary conditions are considered under which the operation is conducted at "sea side" resorts. Our American confreres rightly speak of it as "*surf* bathing," and indeed the admixture of beach rubbish—sand, seaweed, ova and organic matter generally, churned into surf by the action of the waves, and into which struggling children are promiscuously dipped, would seem to be exactly the sort of fluid one would if possible prevent gaining access to the ears, especially if these organs have been rendered unusually sensitive by pre-existing disease. There can be no doubt that it is often productive of harm, probably from the presence of those foreign elements which are inseparable from surf-bathing. The difficulty of the situation may be greatly avoided by using some form of ear-guard, of which that introduced by Dr. Ward Cousins is probably the most serviceable.

Another source of evil is incurred by the bather remaining too long in the water, because the abstraction of body temperature thus brought about is equivalent to a chill, and tends equally with it to produce congestion in the part of least resistance. Therefore from three to five minutes should be the maximum period of immersion, in the case of catarrhal patients.

Diving, whether in fresh or sea water without some protection of the ears, is obviously prejudicial to these organs, because owing to the sudden compression of air in the external canals, the drum heads undergo concussion by the shock of the plunge. It is no defence of the art to advance the many instances of those who have escaped ear troubles, notwithstanding they have practised diving over a lengthened period; the prohibition implied in these remarks having reference chiefly to those in whom the organs are predisposed to take on morbid action, and in whom very slight causes suffice to excite it.

The *Clothing* of the catarrhal subject must be made matter of minute direction. The first principle in reference to it is that the entire surface should be enveloped in woollen material all the year round. The observance of this is as important for the summer as the winter, only that textures of lighter body may be exchanged in warm weather for the thicker material worn in the winter season. The woven fabric known as merino, which is understood to be a mixture of cotton and wool, serves the purpose for vests and drawers; the socks or stockings should be of wool in winter. As a rule three sets of this underclothing should be provided. The winter suit should contain a maximum of wool with a minimum of cotton. For summer these proportions may be reversed. For late spring and early autumn a suit intermediate between the two should be adopted.

It may be accepted as an axiom that during fourfifths of the year in these latitudes the underclothing of *every* individual should consist mainly of woollen material, in all, *i.e.*

but the few weeks of warm summer weather with which these regions are favoured. Notwithstanding this fundamental principle, it is quite common to meet with young people, especially girls, the subjects of advanced stages of chronic catarrh, whose clothing is most inadequate. They wear in fact nothing but a thin stratum of cotton or linen next the body, and in many cases this does not extend beyond the shoulder strap, while the upper portion of the chest is unprotected save by the outer dress. It is not sufficiently recognised that cold arms are a fertile source of chills, though this will be readily understood when the relations of the brachial nerves to the cervical ganglia have been grasped.

Such subjects will constantly affirm they cannot wear flannel or any kind of woollen clothing next the skin, in consequence of the intolerable irritation it occasions; under these circumstances a texture called Indian gauze may be substituted for it, or suits of *wash leather*, or silk may be selected. The point to recognise and insist upon is that the underclothing should be made of a bad conductor of heat, such as wool is, in order to guard against the rapid lowering of the temperature the result of climatic changes, exposure to which is unavoidable during a great part of the year. Presuming the indications just insisted upon to be carried out, it is of less importance of what material the more superficial garments consist, as common sense will usually lead to such modifications in this respect as comport with the changes of weather.

Apart from the foregoing observations, there are various acts of omission as well as of commission, in the mat-

ter of clothing, to which allusion should be made on account of their catarrhal tendencies. One of these relates to the disproportionately thin boots or shoes in which many persons, more especially females, take their outdoor exercise. A reference to what has been advanced respecting the frequency with which a chill striking the feet and lower extremities developes catarrh, will make any further comment on the importance of being adequately shod unnecessary. Although a trite observation it is requisite to insist upon the necessity for changing every article of wearing apparel which may have become damp, immediately the opportunity offers of doing so. Allowing such to dry upon the wearer implies a process of evaporation, which indoors, and on the cessation of active exercise, can only be accomplished at the expense of the intrinsic heat of the economy, and means a chill equally with any other method of bringing about this issue.

An excess of zeal in wrapping up the neck is to be avoided when taking exercise. The woollen or fur mufflers worn for this purpose induce a moist and relaxed state of the skin which engenders susceptibility to chills, and should therefore be avoided. An exception to this precaution must be made when exposure to draughts is incurred while the subject is in a passive state as regards exercise. Travelling by carriage or railway presents these conditions, and it is well under such circumstances to protect the ears and neck against the influence of draughts.

The *Bedroom* of a catarrhal patient should be warmed by means of a fire, more especially if the weather be damp as well as cold; an arrangement which will serve the further

purpose of securing the ventilation of the sleeping apartment. The custom of allowing delicate young people to pass from a warm sitting room to undress in a cold bedroom, is as absurd as it is common. Many of the subjects in whose interest these remarks are made suffer severely from *cold feet* when in bed, as well as from *chilliness of the surface* generally. The former may be guarded against by replacing the socks or stockings worn during the day by another pair of similar woollen texture. The latter state will in a measure be prevented by the use of cotton rather than linen sheets. The bed-clothing should be warm but light, both of which conditions may be fulfilled by the use of an eider down quilt. In some cases it may be desirable to warm the bed by placing in it a hot water bottle an hour or two previously to its being occupied, and this may be removed or not according to the taste of the patient. It should be distinctly understood that *all* the apparel worn during the day should be exchanged on going to bed, and previously to investing himself in his night dress, the patient will experience great comfort by rubbing himself, or being rubbed, with a thick rough dry towel.

The able-bodied, Spartan-minded reader may deem these suggestions calculated to innervate those who adopt them. But it must be remembered that I am dealing with a class whose physique is already depreciated, and the attempt to "harden their constitutions" as it is delusively termed, will only defeat its object by producing confirmed invalids, if it do not terminate fatally.

Diet. From the remarks already made (*vide* Chap. II.) respecting the initial fault in the digestive functions of

catarrhally disposed individuals, it is obvious that intelligent effort should be directed to minimise this evil by careful supervision of their diet. In the following summary of observations directed to this end I shall attempt to indicate general principles only, as experience will show that each case must be dealt with on its own merits.

The fundamental error in this relationship consists usually in the excessive quantities of *sugar* ingested. The deleterious effect of this article of diet begins in the mouth, where its presence checks the action of the saliva in converting starch into sugar (Foster), leaving this element (starch) to be dealt with by the pancreatic juice, and in that part of the intestinal tract which is already labouring over its work. The presence of sugar in excess further prejudices the digestive processes of the stomach, where it increases the flow of mucus and impedes the action of the gastric juice. Few persons perhaps realise the vast quantities of sugar they consume in the course of a year, and the taste for it seems to be in inverse proportion to the capacity of the system rightly to dispose of it. Thus it enters largely into almost every fluid partaken of, such as tea, coffee, malt liquors etc., while spirits, which it is the obnoxious custom to drink in varying quantities towards night, are frequently rendered more hurtful by the addition of sugar.

It is true that a large exception must be made in respect of saline and aërated waters, the growing consumption of which appears to be the response to an intuitive demand for something to counteract a felt evil in the system. Sugar is the unrecognised bane, and weak saline carbonated wa-

ters the antidote which experience teaches will dilute, neutralise, and to some extent eliminate the former.

But sugar is ingested with solid as well as with fluid diet, *all the rôle* of sweetstuffs with which cotemporary cookery tempts the palate, already jaded with its antecedent courses of animal food, depends upon it for their attractiveness. When it is remembered that the destination of all farinaceous foods, is to furnish to the system products of the sugar series in forms most suitable to its requirements and designed methods of appropriation, it is not too much to affirm that most constitutions would be the better for limiting the supply of carbo-hydrates to the sources indicated by nature for this purpose.

Reflecting on the large amount of sugar consumed annually by western nations, it has occurred to me that an interesting parallel might be drawn, if the material were procurable, between the character of common diseases affecting European nations, especially the dwellers in these Islands, before and since the introduction of sugar from the West Indies. It is probable that the parallel would tell against the sweetstuffs; that catarrhs, gout, rheumatism, neuralgias, indigestion, melancholy, bad temper, and other minor ills, were less common previously—a conclusion which suggests that the sum of physical happiness has not been enhanced, so far as the dwellers in these latitudes are concerned, by the extensive introduction into their food of this product of tropical suns.

The inference respecting the diet of the catarrhal subject is, that the quantity of sugar entering into it should be greatly reduced. He should take his meals regularly, and

at intervals not exceeding 4 hours. Remembering that far more animal food is also consumed than is needed, a remark that applies especially to adults in whom the growth and development of the frame are completed, it will satisfy all the requirements of the economy if meat be taken twice daily and in much smaller quantity than it is the usual habit to do.

The positive indications for these patients' diet is that they should partake as much as possible of fresh fruit, preferably oranges and lemons, also of such fresh vegetables as greens, celery, lettuce, tomatoes, sea-kale, endive, water-cress, and the like. A difficulty at present exists in procuring these in the quantity and of a quality to render them acceptable to those who most require their use. It would be some compensation to the community at large if the outcome of the recent agricultural eclipse should be to encourage the cultivation of vegetables, in larger quantities and in greater variety, than has hitherto obtained. It is however a curious commentary on the above remark that whenever agriculture has in the past taken the turn here advocated it has done so in the wrong direction. Thus its energies have beeen given to the production of large crops of rhubarb and potatoes, the former of which from the abundance of oxalic acid present in it is most deleterious to all who consume it, especially the young; while potatoes if not actively injurious are usually partaken of more freely than is desirable.

It would be to the advantage of our clients if they would drink more *water* and less of its modern substitutes. Here again the difficulty is to get it in a state suitable for the pur-

poses of diet. I have already spoken of the advantages of ordinary aërated waters in this respect: another, not so well known but of great merit is "*Salutaris water*" which is pure distilled water charged with carbonic acid. On the latter account it is refreshing to the palate, it contains no harmful elements, and is supplied at a reasonable price.

Whether or not these patients should habitually have recourse to *Wines* or *Spirits* is a question that will continually recur. No general answer can be given, as each case must be decided on it merits. Speaking broadly it will be safe for the young, *i.e.*, those who have not attained adult age, to avoid these accessories altogether. Notwithstanding, in very enfeebled constitutions where there is lividity and coldness of the extremities, an alcoholic stimulus may be serviceable. In such cases I prefer to give a definite quantity of spirit in aërated water once or twice daily, rather than the more common instruction to take claret with one or more of the regular meals.

Tobacco smoking in young subjects should be prohibited altogether. In older ones, if the conditions of Swift's aphorism were strictly observed, to the effect that the man who daily smokes two pipes escapes both colic and toothache, possibly the Elysium he promises might be realised. Swift himself as the sequel will show, was not a happy illustration of his own principles, affording as he did the worst development of ear disease. In all cases where this latter affection has supervened, or its frequent precursor post nasal catarrh, is established, smoking in any form and however limited in extent is distinctly prejudicial. The physiological effects of tobacco-smoking are discussed on

another page; here, it will suffice to say that experience supports what theory will later on explain, viz.—that tobacco-smoking in any form is positively injurious to catarrhal patients.

Exercise in the open air is imperative. It should be taken regularly, short of fatigue, and when possible in full sunshine. As to the kind of exercise, whether it should be walking or riding on horseback is matter of small import so that the foregoing conditions be complied with. Walking is often avoided on the score of its being uninteresting, and riding is not within the reach of all. The use of *tricycles* which has recently attained favour with both sexes appears to supply a real want, and as it requires the exercise of some skill and nerve presents attractions to many; it is certainly of eminent utility, fulfilling as it does all the requirements of out-door exercise.

There are certain conditions of the ears accompanying catarrh which are in themselves of trifling import, but which may by mis-management become sources of disease in these organs.

The following are of this kind:—

During, or subsequently to a transient cold, the external auditory canals may become irritable and induce an almost irresistable desire to scratch or rub them. With this view various small implements, such as tooth-picks, hair pins, knitting needles, pointed pencils etc., will be introduced within the canal, with the result of rubbing off the delicate cuticle which lines it, and the probable induction of an external otitis. Instances in which the drum-head has been pierced in this way are by no means rare. Again,

in the pursuit of cleanliness of the ears, some persons insert into them the tightly screwed up corner of a towel: or, an instrument called an aurilave, which consists of a piece of sponge attached to a slender handle, is used for the purpose, both of which proceedings cannot be too strongly condemned. All these requirements of the toilet are satisfied by placing a soft handkerchief over the end of the little finger and with it cleansing the orifice of the ear.

To allay the irritation first referred to, a small pinch of finely powdered boric acid should be blown lightly into the canal by means of an insufflator.

On the subsidence of a catarrh, again, it is not uncommon for the patient to complain of a *feeling of stuffiness* in one or both ears, and the conclusion forthwith arrived at is that cerumen has accumulated and must be removed. Failing relief by ordinary domestic resources the family physician is called upon to officiate. If he be guided by the patient's assertions, and not by conclusions arrived at after careful inspection of the canal, he may repeat the syringing, perhaps with a larger engine and with greater force. The result can only be productive of harm, because in a large majority of cases the "stuffy sensation" complained of is located in the Eustachian tubes, and has no reference to the external meatus. It will be relieved by local medication of the post nasal space, followed by inflation with a Politzer's air bag. Observance of the following rules with reference to *syringing the ears* will save future trouble:—

It should never be intrusted to an uninitiated person; it should only follow an actual examination directed to ascertain its necessity; during the process the ear should be

repeatedly inspected so that the syringing may be discontinued as soon as its object is accomplished.

It will be shown in the sequel that affections of the nose are often concurrent with those of the ear. Patients thus afflicted are apt to *blow the nose violently*, and in so doing some will experience very uncomfortable degrees of giddiness, or may even rupture the drum membrane. The cause is the same in both instances and may be thus explained. Owing to the strong expiratory effort which precedes the act, accompanied by closure of the external nares, the air contained in the naso-pharynx becomes suddenly condensed, and forces its way through the Eustachian tubes into the middle ear, where its expansion causes pressure on the membranes closing the fenestræ, with consequent giddiness by setting up tension of the intra-labyrinthine fluid. If the drum-head be sclerosed, or otherwise pathologically altered, it may give way before the pressure, and a rupture be produced. The inference is obvious and needs no further comment.

CHAPTER VI.

DIAGNOSIS OF CHRONIC CATARRH. APPLIANCES REQUIRED FOR AND METHODS OF EXAMINING FAUCES, NOSE, AND POST NASAL SPACE. NORMAL APPEARANCES DESCRIBED.

With the object of making more intelligible the morbid states of the nasal and post nasal cavities induced by chronic catarrh, I propose in the present chapter to recount the method of examining these localities, adding thereto a brief description of the normal appearances they present.

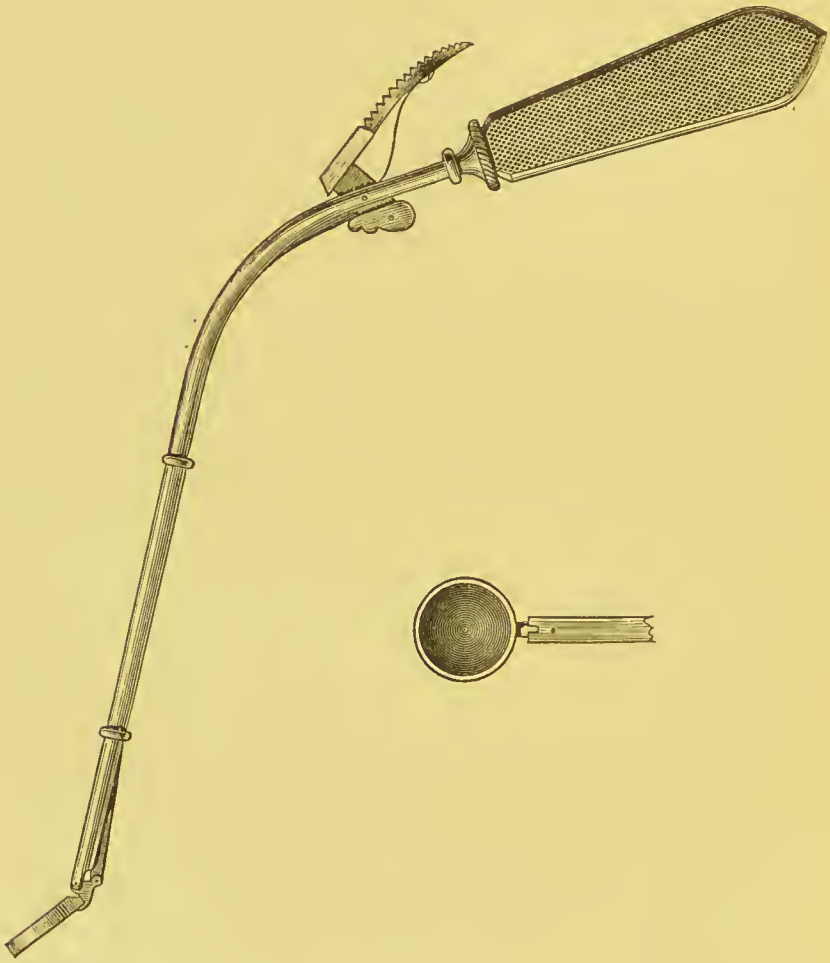
The appliances and instruments required for this examination are 1st, *a good light*, capable of being directed into the recesses it is desired to illuminate. For ordinary purposes a moveable gas bracket, fitted with an argand burner, and bull's eye condenser such as is in general use in laryngoscopy, will suffice. Some form of Drummond light, that is an oxy-hydrogen lime light has been of late years introduced for this purpose, and is indispensable for operating within the cavities concerned.* 2nd, the ordinary *fore-*

* The form I use is made by Mayer and Meltzer; the iron bottle for containing compressed oxygen gas is self-regulating, and by its use the cumbersome rubber bag and weights for supplying this gas are dispensed with, thus lessening the original cost of the apparatus, and minimising the space occupied by it. The lamp itself is attached to the gas bracket referred to above, and by its means can be brought to any level required; while common gas representing the hydrogen, is supplied through it, as when in ordinary use, except that the argand burner is replaced by the lime lamp. These are interchangeable, one being made readily to replace the other, according to choice.

head mirror for reflecting the light on the patient; it may be worn in the same manner as in examining the larynx, *i.e.*, either attached to a spectacle frame, or a forehead band. 3rd, a *rhinoscopic mirror;* this may be either the smallest size laryngeal mirror, or the infinitely more convenient form of this specially arranged for rhinoscopy. The mirror in this instrument can be moved by a trigger attached to the handle, from the horizontal plane to a right angle, which greatly facilitates its use. It is represented half size in the adjoining cut. 4th, *a tongue depressor.* This is usually made too large in the blade; several sizes should be at hand, and each should be fitted at right angles to a handle. Various patterns are in use, but the observer will adopt that form which in practice he finds most convenient to himself. 5th, *Anterior nasal specula.* These are very numerous and vary much in utility. The choice will depend upon whether the object is diagnostic only, or whether it is to assist operative procedures. In the former case, *i.e.*, for observing the anterior nares, I generally prefer Kramer's ear speculum, because of the facility of introducing it, and because the distension of the blades being independent of a spring can be controlled by the observer, so as to avoid giving pain. In proceeding with any instrument to expand the anterior nares, the extreme sensitiveness of these orifices should be borne in mind, and, also, that the dilatable portion is limited to the region from which true cartilage is absent. It is necessary therefore to avoid any approach to roughness in this manipulation, as otherwise the natural objection which patients manifest at any interference with the nose, will be

greatly emphasized. For the same reason I rarely use Zaufal's tubes, as these besides causing pain are apt to produce bleeding and so to obscure the observation.

FIG. 2.



Frænkel's Rhinoscopic Mirror, half size.

For *operative purposes* Thudichum's speculum is most generally useful, though it has the disadvantage of requir-

ing to be held *in situ* by an assistant. The hooks, devised by Mr. Baber, attached to elastic bands which fasten at the back of the head and so hold open the meatus, are free from this objection. For operations on the inferior turbinated bone I prefer the speculum of Dr. Shurley, of Detroit, U.S.A., which is not only self retaining but being furnished on the septal side with a long ivory slide permits the septum to be shielded from any accidental contact with the instruments employed during the operation. Any inconvenience arising from the vibrissæ or short hairs, which guard the entrances of the nares, may be obviated by first removing them with blunt-pointed scissors.

For the examination of the *Eustachian tubes* special appliances will be required, for though the rhinoscopic mirror enables their orifices to be inspected, this will convey little or no information respecting the state of these canals in their entirety. For this latter purpose Politzers inflation may be had recourse to, or the process of Valsalva may be employed. In my opinion both these proceedings are deficient in exactness, relative to the information they impart, and though useful each in its sphere to aid treatment, cannot compare as a means of diagnosis with the instruction derivable from *catheterisation of the tubes*. To perform the latter operation effectually, a supply of catheters is necessary, as well as a light tube to connect the operator's ear with the external auditory canal of the patient, and which tube, for no very obvious reason, is termed an *otoscope*. Also, a hand ball-bellows will be required, the tube of which ends in a nozzle exactly fitting the expanded end of the catheter.

To facilitate catheterisation of the Eustachian tube I have for a long time adopted a shorter *catheter* than that in ordinary use, following in this respect the example of Dr. Weber-Liel of Berlin, and of Mr. Hodgson of Brighton; The latter aurist informs me he had used a similar modification for nearly ten years, though he does not appear to have published a description of his instrument. The catheter thus shortened is represented in the adjoining cut. The distal end is slightly bullet-pointed; it should be made of silver to allow of altering the curve to the requirements of each case; the question of curve being of more importance than the calibre of the instrument. The disadvantage of the long or Kramer's catheter resides in the fact that all that part which projects beyond the anterior nares when introduced, becomes the arm of a lever, any movement of which tends to displace the opposite end from its position in the mouth of the Eustachian tube. All but the funnel-shaped orifice to receive the nozzle of the bellows, is therefore not only unnecessary, but adds by its unsteadiness to the difficulty of the operation. The length of my instrument is such that when introduced in an adult of average proportions only the funnel projects beyond the nasal meatus. This is grasped by the forefinger and thumb of the left hand, while the remaining fingers are steadied on the forehead of the patient. As the straight portion of the catheter now rests on the floor of the nose, while the distal end is engaged in the mouth of the Eustachian tube, a degree of solidity is imparted to the arrangement which no ordinary movement on the part either of operator or patient, will disturb. The method of introducing the catheter will be described later on.

Before dismissing this subject it is necessary to insist on the importance of observing the utmost *cleanliness* with regard to the instruments just referred to. Immediately

FIG. 3.

Author's catheter, exact size.

after use, any and all of them should be immersed in water charged with carbolic acid or other disinfectant, and each should be wiped quite dry before being employed upon a fresh case. This remark applies with additional force to catheters, which besides being treated as above, should be carefully blown through to expel any mucus lodged within the tube. If the slightest suspicion of a syphilitic taint exist, in the case last examined, the further precaution should be taken of exposing the instrument to a strong heat, short of redness—by holding it over the flame of a gas burner, prior to further use. These details will be facilitated if the operator's table be provided with a vessel containing the disinfecting fluid; it should also possess a pile of little cloths of the size known as "tongue cloths" among laryngologists, each of which when used should be thrown into a receptacle for the purpose, so that it cannot be employed a second time.

Method and Order of Examining Patient. Points to be Noted in the Examination.

A glance at the anterior and posterior nares will usually disclose the presence of retained mucus in these localities, for the removal of which, it is desirable to subject the patient to a *preliminary spraying*, the method of accomplishing which may be first glanced at, as no effective examination can be conducted while the regions are obscured by adherent secretions. Reference to a surgical instrument maker's catalogue will disclose a puzzling variety of spray

appliances, and from these choice may be made. They are for the most part worked by a double hand ball-bellows, though some prefer an arrangement worked by steam, after the fashion of Beigel's well-known apparatus. For consulting room use the reservoir for holding compressed air, suggested by the ingenuity of American practitioners, and perfected in London by Mayer and Meltzer, will be found most convenient, especially if fitted with Sass's tubes, or some modification of these. By its intervention the fatigue of pumping the bellows is avoided, while a steadier and more powerful spray is produced. The anterior nares are first sprayed and then the posterior nasal region, above the soft palate, by means of a suitably contrived tube. The solution used for this purpose (preferably that of bicarbonate of soda ʒ ss, carbolic acid 3 ss, to the pint of water), should be decidedly *warm*, as it is not then so apt to excite a flow of mucus, which occasionally follows spraying. Should this occur the further examination of the patient must be deferred for a short interval, to allow of its subsidence. In the meantime the external ears can be examined, after which the inspection of the nasal region can be proceeded with, and any discharge still remaining may be removed by absorbent wool.

Examination through the Mouth.

The patient should be seated directly in front of the surgeon, who directs the light reflected from the forehead mirror upon the lower half of the face of the former, and instructs him to open his mouth. This affords the oppor-

tunity of observing the patient's tongue, the state of which should be noted, and such inquiries be prosecuted as its appearance may suggest. I am disposed to insist on this point for two reasons. First, because in the early stage of catarrh nearly always, and in its later phases very often—there is marked derangement of the digestive functions, with constipation; conditions that would be expected to obtain if the observations on the etiology of catarrh already made, be borne in mind—and which will at once be suggested by the furred and sticky state of the tongue; and because unless all that is here implied be grasped and dealt with in prescribing,—no improvement will ensue from local treatment only. Secondly, because the mere specialist, in his zeal to examine the organ which he regards as his peculiar domain, is apt to overlook important general indications meeting him in his pathway. Such an omission will frustrate the issues of the most advanced specialism, and expose the system to unmerited obloquy. From every point of view therefore, the questions above discussed cannot be regarded as supererogatory.

Palate and Fauces. Persons who are undergoing examination of the faucial region, are very apt to hold their breath, with the view of aiding the process, though in reality, the so doing, largely interferes with it. Therefore tell the patient to breathe naturally until otherwise directed, as thereby the veil of the palate remains passive in a pendant position, when its condition can be best estimated. Its *colour* should be first observed, with reference to *anæmia*, for there is no region which gives earlier or more correct evidence on this point, than does the soft palate when thus

inspected. The presence or absence of *paresis of the palate* should also be ascertained, and whether this be sensory, or motor, or both combined.* The tongue depressor may now be applied, taking care that the blade of the instrument be not introduced beyond two-thirds of the length of the dorsum of the tongue, as otherwise retching will ensue. No more pressure should be exerted with it than suffices to expose the pharyngeal wall. In this way the whole region will be much more satisfactorily exposed, than will be the case if the patient be allowed to "show his throat" by his own intuitive method, which implies strain on all the muscles of the part.

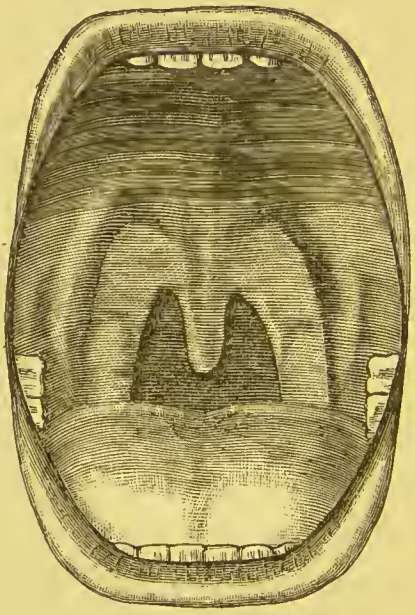
A rapid survey must now be made of the condition of the parts brought under observation, *e.g.*, the length of the uvula; the relative positions of the arches of the palate; the state of the pillars of the fauces, as to hypertrophy; the condition of the tonsils as to size, and whether they be the subjects of follicular or general inflammation; also of the covering mucous membrane as to injection, inflammation, œdematous swelling, &c.; while a general estimate must be formed, as to the acuteness or chronicity, of the appearances observed.

A fairly correct outline of the *normal fauces* is given in the adjoining figure, though considerable variation must be allowed for on the ground of bony configuration—a long deep upper-jaw permitting greater length to the pillars, which will be proportionately shorter, and the

* The bearings of paresis of the palate as a factor in the causation, of deafness, is further discussed in the succeeding chapter.

arches wider, if the superior maxillæ be broad and shallow. All the lines and markings should be clean cut, so to speak, of a pale red colour, with a slightly glistening, smooth, and moist surface.

FIG. 4.



Normal appearance of fauces.

Passing to the *posterior wall of the pharynx*, the same remarks as to physical appearances and clearness of definition apply to it as to the preceding regions. It should be flat in the middle, rounding off somewhat into the lateral walls, which are obscured by the posterior pillars of the

fauces. A comparatively small portion only of the pharynx can be seen through the mouth, when the tongue is depressed and the patient be breathing as directed; but by instructing him at this stage of the examination to inspire deeply, or to phonate the sound *ah*, the soft palate is drawn upwards exposing a large view of the pharyngeal wall. There will now come into sight in most subjects, a *prominence* seated in the middle line, corresponding with and caused by the protuberance on the anterior arch of the atlas. The existence of this projection becomes of practical importance when it is proposed to introduce instruments, brushes, spray appliances, &c., above the soft palate into the post nasal space; care must then be taken to avoid this obstruction, by passing to one or other side of it, or otherwise a painful and bungling failure will be the only result of the attempt.

What remains above this point, including the vault of the pharynx, can only be seen in the rhinoscopic mirror, to the method of using which and the region explored by its means, I shall now direct attention.

Posterior Rhinoscopy.

It is necessary to premise that all persons are not at once amenable to posterior rhinoscopy. For instance, where there is paresis of the palate, or hypertrophy of the fauces, or an excessively irritable faucial region, a preparatory course of treatment directed to subdue these several obstacles, must be adopted, before a satisfactory examination of the naso-pharynx can be accomplished.

Various accessory measures have been recommended by authors, with the object of facilitating this inspection. Such are—catching the uvula in a loop of silk or wire, and by its means drawing forwards the soft palate; passing a curved fenestrated spatula behind the velum, and so making forward traction upon it; Frænkel's gag, an ingenious device combining in one instrument a mechanism for holding open the jaws, depressing the tongue, and drawing forwards the soft palate—but which would scarcely be tolerated by one patient in fifty in this country;—are alike in my experience, hindrances rather than aids to the use of the rhinoscopic mirror.

Exception must be made in favour of the so-called "Wales's method," which may be had recourse to in emergency either for diagnostic or operative purposes, and for ease of application and efficiency is superior to any other. It consists in passing a piece of soft string, previously stiffened at one end by saturation with mucilage (a useful addition suggested by Bosworth to facilitate its introduction), through the anterior nasal meatus, until it appears below the soft palate, when it is caught in a long pair of forceps and drawn out of the mouth. A similar process is then gone through with regard to the other nostril. The two ends of each piece of string are respectively tied together outside the mouth, firm traction being made while doing so upon the velum. The latter is thus held forwards in a manner best tolerated by the stretched tissues, and space afforded through which to observe the exposed region. Previously to becoming acquainted with this method I had used lead wire in a similar way to the preceding,

but have abandoned it in favour of the string proposed by Wales. Practically, however, such a measure is rarely required, because with a little training on the part of the patient, and sufficient tact on that of the observer, the following directions will suffice.

The patient and surgeon should be arranged as for a laryngoscopic observation, the former being directed to hold his head slightly forwards, and to breathe through his nose while keeping his mouth wide open. The observance of these details is essential to secure a flaccid and advanced position of the velum, which will otherwise tend to be drawn backwards against the pharyngeal wall as soon as the tongue is depressed, thus rendering the proceeding an abortive one. It is just these preliminary steps that the patient can practise by himself, and if ordinarily intelligent will soon bring the region in question under control. The surgeon now lightly depresses the tongue with a small tongue spatula held firmly in his left hand, taking care not to place this too far backwards, for the reason already stated. With the right hand he introduces the small rhinoscopic mirror, previously warmed, into the pharynx behind the root of the tongue, taking care not to touch its sensitive posterior wall, and in such a way that its stem rests in the left commissure of the patient's mouth. By gently pressing the trigger with which the handle of the instrument is furnished (*vide* fig. 2), with his right thumb, the observer can change the angle of the mirror from the horizontal plane to a right angle, and can maintain it at any intermediate angle he may desire. The light reflected from the forehead mirror is now thrown

upon the smaller one located in the pharynx, whence it is directed upwards illuminating the space above the velum, while the image of the part upon which the rays of light fall becomes visible in the glass of the rhinoscope.

In this way the posterior wall of the pharynx with the pharyngeal tonsil, the vault and the choanæ or posterior openings of the nares, with the corresponding aspect of the septum nasi and the posterior surface of the velum palati, come successively into view, as the mirror is moved as above directed. To see the lateral walls of the pharynx and the orifices of the Eustachian tubes and Rosenmüller's fossæ, it is necessary to turn the mirror slightly towards the side it is desired to view.

The reversal of the image in the mirror, as in laryngoscopy, is a source of confusion at first; indeed much practice is required to overcome it, owing to the complicated outline of the parts brought into view and the varying depths at which these are seated. It must not therefore be expected that the entire region will be seen in the mirror at one glance, an impression that might be formed by inspection of the diagrams used to illustrate this description. Moreover the appearances vary much in different subjects, the salient points being more marked in some and much less so in others.

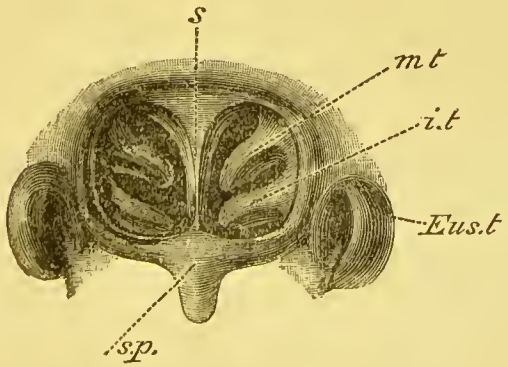
Anatomy of the Post-Nasal Space.

The post-nasal space is a somewhat domeshaped cavity. its apex forms the vault of the pharynx and reaches to the base of the skull. *The anterior boundary* is constituted by the

sharply defined margin of the posterior bony framework of the nasal cavities; it presents a large arched-shaped opening divided into two portions by the nasal septum, formed by the descent of the vomer from the sphenoid bone to join the floor of the nasal cavity, which, with the assistance of the middle plate of the ethmoid bone above, and the cartilage of the septum in front, it divides into the two nasal fossæ. The posterior openings of the nose are commonly spoken of on the continent as the *choanæ*. In this space are seen on each side the posterior terminations of the lower and middle turbinated bones with their coverings—occasionally, a small portion of the superior turbinated bone comes into view; by means of these the nasal fossæ are sub-divided into the inferior, middle, and superior meatus or channels of the nose.

Neither of these turbinated bones *projects in the normal*

FIG. 5.



Anterior boundary of post-nasal space, showing choanæ and contents. *s.* Septum. *mt.* Middle turbinated bone. *i.t.* Inferior turbinated bone. *Eus.t.* Eustachian tube (left). *s.p.* Soft palate (foreshortened).

state beyond the margins of the fossa to which it belongs; nor should it extend so far towards the middle line as to touch the septum, though they frequently furnish morbid tissue which may fulfil both these conditions.

Thus the anterior boundary of the naso-pharynx is not in any sense a wall, but presents the cavities and their contents above described. In examining it with the rhinoscopic mirror, the first step should be to recognise the septum, which being a prominent and sharply defined object situated in the middle line, will enable the observer to localise the adjacent parts. The boundary lines of this aspect are paler in colour than the rest of the space, owing to the muco-periosteum being closely adherent to the subjacent bone, while the portions of the turbinated bones which come into view are, or should be, of a whitish tint. The interspaces between the turbinated bones are quite dark, and if we attempt to trace the outlines of these forwards into the nasal fossæ, we find them shortly lost in the shadows of the recess.

Having noted whether the tissues present the appearances indicated, we may next inspect the upper surface of the soft palate by bringing the mirror into a yet more vertical position. The width of this surface being fore-shortened will appear much narrower than it really is. It may be inspected for excrescences, adherent mucus, ulcers, etc. It constitutes the moveable floor of the space and will be again alluded to in this relationship.

The roof or vault (fornix pharyngis) passes immediately backwards from the point at which the vomer leaves the sphenoid, and blends insensibly with the posterior wall.

In the horizontal position it corresponds to a line drawn immediately above the antitragus of the auricle (Luschka). Occupying the whole of the vault and passing a variable distance downwards on the posterior wall, is situated a mass of lymphoid tissue closely resembling in structure that of the faucial tonsils, and called therefore the *pharyngeal tonsil*. This organ is sometimes called "Luschka's tonsil," after the German anatomist who has furnished the most elaborate description of the post-nasal space and its contents, and to whom every subsequent describer of this region must acknowledge his indebtedness. It must not however be forgotten that in this country Sir Andrew Clark described the gland in question and experimented upon its functions as early as the year 1864.

It is customary to speak of the pharyngeal tonsil as presenting a tolerably uniform outline, pitted with lacunæ-like depressions, and projecting but little beyond the surface of the mucous membrane, but penetrating the subjacent tissues to various depths, being thickest in the vault and gradually fining off, and becoming lost in the tissues forming the posterior wall. My own observations of the contour assumed by this organ, when morbidly affected, point to the fact that it consists of two lateral portions roughly separated from each other by a division or interspace continued backwards from the position of the vomer. The recognition of this division enables the observer to differentiate his diagnosis of the disease inspected, for while a simple enlargement of the organ will bring out and emphasise its segments, mere excrescences upon the gland surface will obliterate and conceal them. Occasionally a

third middle portion is met with much smaller than the preceding, situated at the fornix, where the lateral lobes diverge.

When pathologically enlarged this central portion projects forwards and downwards over the choanæ, while the tendency of the lateral segments, under similar conditions, is to invade Rosenmüller's fossæ, and to press upon the cartilage of the Eustachian orifices. The diseases of this organ and their important bearing on the subject at issue, will be subsequently discussed.

The posterior wall of the naso-pharynx is continuous with the vault, and passes without any line of demarcation into the pharynx proper. It is freely studded with solitary simple glands or follicles. Its exact limit is liable to constant variations owing to the moveable nature of the floor of the space, which being formed by the soft palate as already stated, is subject to change its position with each act of swallowing, speaking, or breathing.

Consequently the *floor* of the post-nasal space only exists as such, when by means of the contraction of the muscles furnished to the locality for this purpose, the pillars of the fauces are advanced towards the median line to meet the soft palate, which is by a similar provision drawn upwards and backwards against the posterior wall of the pharynx. In this act the complete occlusion of the space from the adjacent oral cavity is materially assisted by the position of the uvula, and the close apposition of it to the central projection on the atlas, secured by the contraction of the palatal muscles. This point should be borne in mind when complete excision of the uvula is contemplated; a proceeding which in my opinion is seldom or never demanded.

Just as the roof of the space is lost in the posterior wall, so the latter blends with the *lateral walls*, passing gradually into them without any definite line of demarcation. These divisions of the space derive their importance from the fact that in them are located the terminations of the Eustachian tubes and Rosenmüller's fossæ. To observe this region, say on the right side, it is necessary to direct the mirror upwards to the right, giving it by means of the trigger such an angle as will suffice to bring the mouth of the tube into view. For the opposite side it must be directed similarly to the left. The exact angle will vary in every case, so that no more definite directions can be given, nor could any amount of instruction supply the place of practical familiarity with this region, which alone can produce a skilled rhinoscopist. The *Eustachian prominence* somewhat resembles the closed end of a small thimble having a dimple or depression in its centre, the posterior boundary of which depression is more pronounced than the anterior, owing to the fact that the latter hollows off into the adjacent mucous membrane. The orifice itself is rounded and looks forwards and inwards, while the direction taken by the tube to reach the tympanic cavity is outwards and slightly upwards and backwards. It must not be forgotten that though the orifice has this rounded appearance the lumen of the tube itself is slit-shaped, and in section somewhat resembles the italic *f*. The situation of the Eustachian prominence is on a level with the posterior end of the inferior turbinated bone, a little beyond and to the side of it, and occupies a central position as regards the lateral wall, though this position is subject to variation.

In speaking of the Eustachian tubes as terminating in the posterior nasal space, this must be understood in a topographical or anatomical sense only. Because as a matter of fact the external nasal meatus is the functional or physiological end of the tube. Of this fact I have for some time been convinced on pathological grounds, and have been in the habit of instructing my pupils to this effect. Quite recently it has been pointed out to me that Tillaux, (Anat. Topographique) makes the same observation, "En sorte que l'orifice tubaire paraît être le prolongement du méat inférieur." Article "De l'appareil auditif," p. 137. It is therefore of importance to bear in mind, that it is chiefly the inferior meatus or channel of the nose which contributes to the Eustachian function; that is to say the air which passes in respiration through this passage is mainly that which enters the Eustachian tube. Hence the importance attached in this treatise to the patency of the inferior nasal meatus, and the attention given to the diseases which interfere with its normal state. For it is obvious that if this view be correct, the tube is equally liable to obstruction from stenosis of the inferior nasal meatus, as it is from a similar condition occurring in any part of its length.

While the Eustachian prominence is under observation note should be taken of its condition as respects colour, swelling, the presence or absence of mucus in the orifice, of growths upon it or in its vicinity, and whether any adventitious bands unite it to the surrounding textures. Especially its relationship to the pharyngeal tonsil should be observed, which in the normal state ought not to approach its neighbourhood.

Rosenmüller's fossa is in most subjects a very marked recess, occupying the interval between the posterior wall of the space and the Eustachian prominence. This recess penetrates the tissues of the wall to a considerable depth. It is richly supplied with follicles, and in chronic post-nasal catarrh is often the last to yield to treatment, partly from this cause, and also from the fact that its retired situation renders it more difficult of access to remedies. The chief practical interest of Rosenmüller's fossa resides in its liability to interfere with catheterisation of the tube when the old method of performing this operation is practised. If the directions for this proceeding subsequently given be followed, no difficulty will arise on the ground here referred to.

In order to complete this anatomical survey of the naso-pharynx, the following summary of its vessel and nerve supply is added.

VESSELS.

Receive efferent vaso-motor nerves from lower segments of superior cervical ganglion, called *nervi molles*.

Branches of External Carotid Artery.

			Supplies	
			Muscles.	*Other parts.*
I. Facial	*(a.)*	Inferior or Ascending Palatine Artery.	Tensor Palati. Levator Palati. Azygos Uvulæ. Stylo-pharyngeus. Palato-pharyngeus (with Salpingo-pharyngeus.)	Soft Palate. Eustachian Tube. Tonsil. Palatine Glands.
II. Ascending Pharyngeal.	*(a.)*	Pharyngeal branches.	Tensor Palati. Levator Palati. Stylo-pharyngeus. Superior, Middle, and Inferior Constrictors of Pharynx.	Soft Palate. Eustachian Tube. Tonsil.
III. Internal Maxillary (3rd portion).	*(a.)*	Descending Palatine branches.		Soft Palate and Tonsil.
	(b.)	Vidian branch		Upper part of Pharynx. Eustachian Tube: a small branch going to tympanum.
	(c.)	Pterygo-palatine branches.		Upper part of Pharynx. Eustachian Tube. Sphenoidal Sinus.

	(d.) Nasal or Spheno-palatine branches		Septum Nasi. Mucous Membrane on Lateral wall of nose, and lining antrum. Ethmoidal Cells. Sphenoidal Sinus.

According to Weber-Liel, the Internal Pterygoid muscle has a small slip of origin from the orifice of the Eustachian tube.

NERVES.

		Supplies	
		Muscles.	*Other parts.*
I. Meckel's Ganglion :— . . . formed by branches from	*(a.)* Posterior branches .	Levator Palati . . Azygos Uvulæ, (motor supply).	Mucous membrane of back part of roof of nose and septum.
1. Facial, (mot.) 2. Fifth, (sens.) 3. Sup. Cervical Ganglion of sympathetic	*(b.)* Descending branches	Levator Palati . . Azygos Uvulæ, (sensory supply)	Orifice of Eustachian tube. Soft palate and tonsil. Middle and lower turbinated bones.
	(c.) Internal branches		Superior and middle turbinated bones. Upper and back part of septum. Posterior ethmoidal cells.
	(d.) Pharyngeal nerve		Pharynx behind Eustachian tube.
II. Otic Ganglion :— . . . formed by branches from 1. Fifth, (mot. and sens.) 2. Sup. Cervical Ganglion of sympathetic	*(a.)* Muscular branches .	Tensor Palati.	

III. Pharyngeal Plexus:— formed by branches from 1. Glosso-pharyngeal. 2. Vagus with spinal accessory. 3. Sup. cervical ganglion of sympathetic	. . . . . Palato-pharyngeus. Superior, Middle, and Inferior Constrictors of Pharynx.	Mucous membrane of pharynx generally.
IV. Glosso-pharyngeal nerve:—	. . . . . Stylo-pharyngeus.	

Physiological Functions of the Post Nasal Space.

This region, respecting which it may safely be affirmed that it is a *terra incognita* to most practitioners, either as regards the important functions it subserves in the normal economy, or the diseases obnoxious to it which interfere with these functions—may not be dismissed without a brief allusion to its physiological aspects, preparatory to a consideration of the diseases which bring it within the scope of the issues now under review.

Its chief importance resides in the fact that it is through the nose that normal respiration takes place, and that it is so located as to occupy an intermediate position between the nasal meatus, which are the gateways of the respired current, and the larynx which admits the latter to the lungs through the trachea. It cannot be too strongly insisted upon that the mouth is only subsidiary to this function; and is used for this purpose only when obstruction exists in the naso-pharynx, by which the ingress and egress of air through it is rendered difficult or impossible, or when very hurried respiration is excited by any cause,

and then only as supplementary to the normal channel. A slight amount of reflection will show that it is indispensable to normal Breathing, Speech, and Hearing. Besides these its nerve supply as sketched above, will demonstrate the capacity of this region, when pathologically implicated, to become a centre of reflex phenomena of the most heterogeneous character and of wide-reaching significance.

As the modifications of these functions will come severally under review in considering the conditions in which they occur, it will suffice my present purpose if the mention of them at this stage serves to direct the attention of the reader to the necessity of acquiring familiarity with this region; especially is this requisite if he would understand the meaning of many symptoms which though not absolutely fatal, yet tend to retard development in the young both mentally and physically, and in all ages constitute a barrier to enjoyable existence. One other point of practical import deducible from the foregoing statements, demands a passing notice, it is the absurdity of advising the use of respirators for the mouth only, *leaving the nostrils exposed*, with the view of modifying the temperature of the inspired air; a suggestion which in view of the extent to which this custom prevails, will scarcely be deemed unnecessary.

Anterior Rhinoscopy.

Having completed the examination through the mouth of the fauces, pharynx, and post nasal space with the choanæ or posterior orifices of the nares—a proceeding which or-

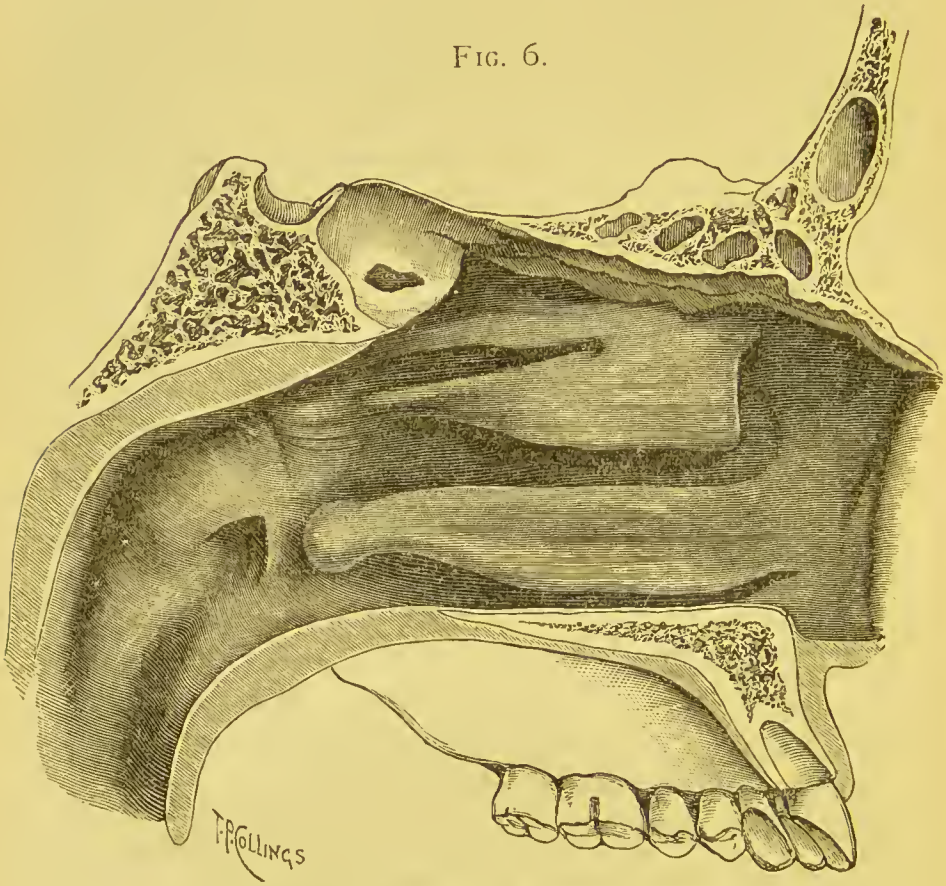
dinarily takes much less time to accomplish than to describe—the next step is the examination of the *anterior nares*. This is most readily done by using a bivalve speculum of Kramer's type, which is introduced only just within the dilatable orifice of the nostril. On gently expanding the blades, there are brought into view on either side, the septum nasi in the middle line; the floor of the cavity; and projecting from the outer wall towards the septum but not reaching it, the inferior turbinated bone, which may be traced backwards from one, to one and a half, inches. There should be a well-marked space between the under surface of this bone and the floor, which forms part of the inferior *nasal meatus*, the integrity of which has been already pointed out as possessing important bearings on the functions of the Eustachian tube. At a short distance within the cavity and appearing to descend from above, though in reality it juts out from the external wall, is seen the straight anterior aspect of the *middle turbinated bone*. In subjects possessing a well developed nasal cavity, a portion of the under surface of this bone, may be followed in a backward direction. An interval should be seen between the septum and this bone, but when thus inspected from the front this clear space is usually very narrow. The descending anterior aspect of the middle turbinated bone is a favorite seat of neoplasms and hypertrophies, so that it is necessary to observe it carefully, especially with regard to the existence of the air-way just mentioned. Immediately below this there should be a clear passage having the inferior turbinated bone to the outside, the septum to the inside, and the floor of the cavity beneath, and with which in the

middle line, *i.e.* towards the septum, all three channels of the nose freely communicate, and through which the posterior wall of the pharynx may occasionally be seen. If however this cannot be accomplished, and it is not often that it can be, it must not of necessity be concluded that the interception of vision is due to the presence of an obstruction. Few internal nasal cavities are thus typically straight, a divergence of the septum, and corresponding bulge inwards of the lower spongy bones will spoil the view, but will by no means obliterate the channel as an air-way. To satisfy oneself on this point it is necessary to pass a long and flexible probe through to the post nasal space, which can often be done almost unconsciously to the patient, although no through passage is visible to the observer. The kind of probe I find most serviceable for this purpose, is made of flexible silver mounted on a handle, and terminating in a small loop, contact with which gives less annoyance than does a blunt probe of the ordinary pattern. Further, it should be mentioned, that any secretion remaining after spraying and which interferes with the examination, should be mopped up with absorbent wool introduced lightly by means of a slender pair of forceps—that known as the crocodile pattern being best suited for this kind of use in the nasal cavities.

The *inferior turbinated bone* is, when normal, of a pale pink colour, somewhat rounded at its anterior aspect, and its mucous covering should be compactly adherent to the bone. The latter point may be ascertained by lightly pressing it with a probe. It frequently assumes great bulk at this part, intruding upon the floor, and reaching across

to the septum, though, normally, a free space of very varying extent should exist between them.

FIG. 6.



Section of nasal and post nasal cavities.

The typical *septum nasi* is a straight flat wall or partition running through and separating the nasal cavities. Though constituted as already mentioned, posteriorly of bone and anteriorly of cartilage, it is not usual for any line of de-

marcation to exist indicative of this division. The covering of muco-perichondrium in front passes backwards into the muco-periosteum by quite insensible gradations. Nevertheless the existence of this duplex formation must not be lost sight of, because it will assist to differentiate the character of any neoplasm which may be present, to note whether it grows from the osseous or cartilaginous section. It is not common, however, to see the septum so architecturally proportioned as the above intimation implies; many degrees of deviation occurring which are quite consistent with a normal breath-way. These lateral divergences are most frequent into the left nostril, and have a corresponding depression on the opposite side. What the observer has to note is whether they be sufficiently marked to obstruct the channel, and whether any adventitious thickening is present, with or without such deviation; and also to observe the lining membrane for congestion, ulcers, &c. Note should also be taken whether dislocation of the anterior aspect of the septum from the maxillary spine exist, for though not a common occurrence, this displacement is occasionally met with either alone or in combination with other abnormalities.

The *nasal floor* so far as it is formed of bone, ends in a line corresponding with, but a little below, the posterior terminations of the inferior spongy bones. It is joined in the centre by the vomer, the posterior free border of which is found in the same vertical plane as this margin of the hard palate. Here the latter is continuous with the soft palate, the muscular structures of each side of which end partly in a median raphé, and partly in the bony structure

of the nasal floor. By this arrangement a strong contraction of the palatal muscles causes the velum to rise up and form a double arch-shaped projection lying behind and against the inferior openings of the posterior nares, in such a way as to obstruct the passage of an instrument beyond them. Hence the importance of causing the patient to breathe through the nose, in order to relax the soft palate, when it is proposed to pass a catheter or other instrument along the inferior meatus into the post-nasal space, as insisted upon in the next paragraph. The floor of the nares though typically straight is subject to almost as many variations as is the septum. Occasionally a long and deep depression towards the roof of the mouth is met with, and the area of the inferior meatus beneath the spongy bone, may be further enlarged by the bulging of the outer wall towards the antrum. A very imperfect idea of the size of this meatus can be gained by inspection, as it is obscured by the presenting portion of the inferior turbinated bone.

The next step in the examination of the patient is the *catheterisation of the Eustachian tube*, with the object of auscultating the middle ear. For this purpose the patient should be seated with his back and head firmly supported in the erect posture. The operator places one end of the otoscope in the external ear of the patient corresponding with the tube to be examined, the other end being similarly placed in his own ear. It will facilitate the accommodation of this instrument if its hard tips be covered with a short length of soft rubber tube, which enables them to be tolerated by the external meatus of each, without that

annoyance which is apt to occur if this precaution be omitted. The surgeon then takes the short silver catheter already described between the forefinger and thumb of his right hand, and introduces it into the nostril of the patient on the side that already supports the otoscopic tube. In doing this, care must be taken to prevent the beak of the catheter striking against the margin of the nostril, or beyond this, the contents of the nasal fossa; to aid this step it may be convenient to tilt up the end of the nose with the forefinger of the operator's left hand. When the beak has thus freely passed the vestibule, it should be depressed, until it is felt to rest on the floor of the nose; it is then passed onwards, being held all the while so lightly that any check which may be encountered, is appreciated by the operator, before pressure has been applied to the obstruction, and pain thereby elicited. Should an obstruction occur, the beak of the catheter must be manœuvred in such a manner as to pass it, without raising the instrument out of the inferior channel, a proceeding which can usually be accomplished by the exercise of sufficient tact. When by the cessation of the resistance afforded by contact with the nasal floor, the operator becomes aware that the instrument has entered the post-nasal space, he should give it a quarter turn inwards, and gently withdraw it until the curve of the catheter touches the septum. The patient having all this time been directed to breathe entirely through the nose and to keep his mouth closely shut, the veil of the palate should not be encountered; the surgeon is now therefore free to make a firm but gentle turn of the instrument over half a circle outwards, following the de-

pendent surface of the palate as his guide, until the ring of the instrument corresponding to its curve, lies horizontally outwards and a little upwards. If this proceeding have been successfully accomplished, the beak of the catheter will be now resting in the orifice of the Eustachian tube. The operator has already placed his left hand, as previously directed, in such a manner that the fingers are supported on the forehead of the patient, leaving the forefinger and thumb ready to grasp the funnel of the catheter as soon as it is placed *in situ*. His right hand is now freed from the catheter and with it he places the nozzle of the tube attached to the hand ball-bellows (previously suspended by a loop from the button of his coat) into the presenting orifice of the catheter. With the disengaged right hand he next compresses the bellows, and in nine cases out of ten will have the satisfaction of finding air enter the tympanum, or at any rate the Eustachian tube.

When the catheter is introduced in this manner the surgeon need not concern himself about the posterior wall of the pharynx, as his instrument does not approach it, and the patient is saved the irritation and cough which are apt to be produced in the old method of procedure, in which contact with this sensitive region is directed to be taken as the guide to the situation of the beak of the instrument. Another advantage of this method is due to the fact that Rosenmüller's fossa is avoided altogether, and no error can arise by the entanglement of the beak of the catheter in it. It is necessary to have some guide to the situation of the orifice of the Eustachian tube, and this is afforded by the straight posterior border of the septum nasi (vomer), with

which the curve of the catheter is brought into contact by means of the quarter turn *inwards*, given to it so soon as it leaves the cavity of the nose. When the concluding step of the operation is accomplished by the half turn outwards, the mouth of the tube will be entered by the catheter. This latter step cannot be executed at all unless the conditions of breathing above indicated be followed, for if the patient breathe through the mouth the veil of the palate will be drawn upwards and fix the catheter as in a vice, at the same time causing much pain to the patient.

The various details of the mode of catheterisation above described have been contributed by several otologists, but especially by Loewenberg of Paris. There are other methods of introducing the instrument, but none so generally applicable as the foregoing. In this as in the case of other minutiæ herein related, I have been guided to the choice by my personal experience of what is practically useful, rather than by a desire to give encyclopædic information.

CHAPTER VII.

ACUTE CATARRH, AND ITS TREATMENT.

A COMMON "cold in the head" affords a good type of catarrhal inflammation generally; and the region affected by it being more or less easy of observation, valuable information respecting similar processes affecting mucous membranes not thus accessible, may be gained by its study. As the interest of my subject centres chiefly in the chronic phases of catarrh, I shall be able to give only a cursory attention to its acute aspects.

When the subject of a chill is developing a nasal cold, the first local indication of the condition is a sensation of fulness or stuffiness about the nose, with unusual dryness of the part, and impeded respiration through it. *Sneezing* is now of frequent occurrence, and as pointed out by Sir Thomas Watson, is the counterpart of the pain which, under similar circumstances, would happen in almost any other region. The absence of pain in the nose is due to the fact, that the inflammatory process is taking place in a cavity, where the tissues are free to swell to a considerable extent, without being thereby subjected to pressure. These symptoms mark the early stage of vessel dilatation, when the normal secretion, which maintains the moisture of the parts, is suspended; and the tissues are distended by excess of blood, which the former are now capable of receiving. Inspection through the anterior nares shows the Schnerderian membrane to have a red, puffy, and glazed appearance.

In a few hours these conditions are succeeded by a flow of thin serous secretion, which in some instances excoriates the meatus and adjacent surfaces exposed to it. Besides the general pyrexia attending this early stage, there is usually headache from invasion of the frontal sinuses, as well as dull aching pain in the cheeks from similar excursion of the congestive process into the antra. The lachrymal canal may be similarly implicated, and by extension to the conjunctival mucous membrane, may induce ophthalmia. If the mucous lining of the Eustachian tubes participate in the process, some degree of deafness and tinnitus will be added to the other symptoms.

It is usual to speak of these successive phenomena as extensions of the inflammation, from the original seat of the attack to adjacent regions. Strictly speaking, however, this is not the case, each area implicated becoming so only in consequence of the efferent response of its vessels, to the original dilator impression—as explained in the chapter on the "Mechanism of taking cold."

The severity of the effect moreover will depend not so much on the intensity of the chill, as on the extent to which the præ-catarrhal stage had advanced, prior to its advent. Some indication of this latter point will be afforded by the excoriating qualities of the secretory flux, due to the presence of foreign elements, which are through it discharged from the system. The degree of attendant prostration and general malaise, are indices of another aspect of the præ-catarrhal state, viz., the extent of loss of vital energy previously experienced by the subject of the attack; or, in more exact language, these symptoms mark the absence of

inhibitory vessel force, on the part of the vaso-motor centres. The difference between an ordinary cold and an attack of *Influenza*, will be found to reside in the presence or absence of this prior drain of nerve force, and when the disease assumes an epidemic form, it implies the prevalence of exhausting climatic environment.

Usually, however, the final stage is shortly entered upon, when the discharges become thicker, tend to dry up and form crusts, resolution being accomplished in from three to four days.

Treatment. When the etiology of catarrh, as explained in the early part of this treatise, is borne in mind, it will be obvious that the adoption of a so-called *abortive* plan of treatment, should be avoided. Regarding a cold as the manifestation on the part of the economy, of an effort to discharge from it certain deleterious agents, the opportunity for doing which has been provided by the chill, it should manifestly be the duty of the physician to facilitate rather than retard the eliminating process. Some authors again, speak of the treatment of a cold, as though the one object to be accomplished were the restoration of temperature, lost during the chill; and though all who have studied the subject animadvert, on the neglect to treat a cold, it is possible that the tendency to become chronic, would be lessened if the wider views, now enunciated, were more generally acted upon.

It will therefore be advantageous to treat all cases at the onset with aperients, except when positively contra-indicated; to give plentifully such diluent drinks as barley water, soda water and milk, and in severe cases alkaline

medicines, of which the citrate of potassa acts most favorably. If there be considerable pyrexia, a few doses of tincture of aconite will check this and give great relief to headache and pain generally. An equable temperature should be maintained, and if the patient be delicate he should lie in bed for a day or two, in order to favour the action of the skin. On rising a soap bath should be administered, after which the patient may safely resume his ordinary avocations. The efficacy of a Turkish bath in checking cold resides in its powerful eliminative action.

Neuralgic pains in the cheeks and about the distribution of the fifth nerve, will sometimes be relieved by tincture of gelseminum ɱv to ɱx; but this remedy if not speedily successful will fail altogether. A persistent nasal flux is frequently checked by smelling strong ammonia.

The *Deafness* usually subsides when the initial swelling of the tubal mucous membrane gives place to secretion, and with it the tinnitus ceases also. Should it not do so, the obstruction now remaining, arises from the retention within the tube of the discharges following upon the secretory stage of the attack. It is of first importance to bring this morbid process to a close, by re-establishing the patency of the Eustachian tubes, because, if the cold be left to cure itself, as is too often the case, a *chronic catarrh* of the post nasal space including the tubal orifices is instituted, and the foundation laid for a permanent deafness of one or both ears.

It is necessary moreover to watch the ears, lest an *acute catarrh of the tympanic cavity* be initiated, with its attendant disintegration of the conducting apparatus of the ear.

Pain, *i.e. ear-ache* is the most certain index of this condition, but it is seldom that the specialist is consulted early enough to adopt measures calculated to ward off the consequences it portends. Ear-ache in connection with a common cold is usually ignored by the family physician, and it would be unreasonable to expect the laity to be in advance of their medical advisers in this respect. Should this symptom occur, the drum-head should be inspected, and if it bulge, or there be other visual evidence of fluid in the cavity, an incision of the drum-head may be practised, and the contents of the chamber be completely emptied by the use of Politzer's inflation. As a rule this measure is to be deferred, till the following instructions have been carried out.

If the inspection be made early, some portion of the lining membrane of the tympanum, will be seen through the drum membrane to be of a reddish tint, notably that pertaining to the promontory, an appearance due to congestion—or the drum-head will show increased vascularity. Under these circumstances three or four leeches should be applied to the concha, the meatus being closed meanwhile with a plug of cotton wool, which is to be removed when bleeding has ceased. If this situation cannot be made available the leeches may be applied in front of the tragus, or over the mastoid process; but the concha is the situation which affords the greatest amount of relief to pain. At the same time a calomel purge should be administered, and also tincture of aconite as above advised. After the leeching, water as hot as can be borne should be run into the ear and renewed frequently. Poultices are to be

avoided. At the same time irrigation of the naso-pharynx with the warm alkaline lotion is to be adopted, followed by the use of the air-bag.

By these measures any fluid tending to collect in the middle ear, will be expelled through the tube, and the necessity for incising the drum membrane will usually be avoided.

There is a form of *suffocative catarrh*, in which dyspnœa supervenes very shortly after the usual premonitory nasal symptoms declare themselves. This difficulty of breathing becomes very pronounced, and may from its intensity, simulate an attack of asthma. I have occasionally been able to trace this occurrence to a rapid enlargement of the pharyngeal tonsil, the inflamed and swollen gland being visible in the rhinoscopic mirror. Though not aware that this cause of suffocative catarrh has been noticed by authors, it appears to me one of considerable importance, both in regard to diagnosis and treatment. That very wide reaching reflexes may be excited by morbid states of the post nasal space, will be apparent from an observation elsewhere recorded,* to the effect that the introduction of the finger or instruments into it, when a patient is anæsthetised for operative purposes, will, unless the anæsthesia be very complete, restore consciousness, apparently by the deep inspirations which follow this act. It is matter of daily experience that brushing this region induces a sense of suffocation, or, as the patients say, "it takes away their

* *Vide*, "Deafness, Giddiness, and Noises in the Head," 2nd edit., chap. on "Post-nasal Growths."

breath," for which reason spraying is a preferable proceeding. This reflex effect may be referred to the branches of the vagus distributed herein, leading in the circumstances detailed, to spasm of the smaller bronchial tubes; and secondarily to excitement of the respiratory muscles, to equalise the supply of air in the lungs.

Be this as it may, there can be no doubt that some forms of *chronic asthma* have their origin in post-nasal affections, and are cured when these are got rid of; and further that the dyspnœic phenomena of so-called Hay Fever, are due to similar reflex irritations originating here.

The importance of differentiating this cause of acute suffocative catarrh from others, such as capillary bronchitis, cannot be over-rated, because severe measures as well as unnecessary anxiety may be avoided by its recognition.

The *Treatment* of such a case is comparatively simple, and consists in irrigation of the part through the anterior nares with the following lotion.

℞ Potass. bromid. ʒ ij.
Sodæ bicarb. ʒ ij.
Aquæ ℥ viii. misce.

One table spoonful of this lotion diluted with twice the quantity of hot water, to be applied every four or six hours, by means of a nasal spray, douche, or syringe.

A suitable purgative should be administered. In the course of two or three days the swollen gland resumes its normal size, while the dyspnœa is rapidly relieved. If resolution be not so speedily effected, the region should be brushed or sprayed with a solution of chloride of zinc, gr. xv—gr. xx to ℥ j water.

The chronic forms of disease of the pharyngeal tonsil will be treated of later on.

That *acute catarrh is contagious* there is in my mind no doubt. That this is a generally accepted dogma amongst the laity, whose broad conclusions are usually based upon experience, should have due weight. I have elsewhere in discussing the "Etiology of Diphtheria" considered this question, and only refer to it here as an instance of the uniformity of type, pervading the class of catarrhal diseases generally.

CHAPTER VIII.

CHRONIC PHARYNGITIS.

Chronic Pharyngitis, in one or other of its several phases occupies a prominent position amongst the causes which constitute "post nasal catarrh." In treating of its etiology and pathology I shall follow the lead of my own observations rather than the teachings of the books. Three forms of the disease are usually described, viz. *Simple Pharyngitis*, *Follicular Pharyngitis*, and *Pharyngitis Sicca*. Most writers regard these as separate complaints, and doubtless there are reasons to justify the so doing. When, however, it is considered that distinct gland structures are distributed throughout the mucous membrane of the pharynx, besides the tonsillar organ special to it, it will not appear inconsistent with analogous processes elsewhere, that in some instances the totality of tissues should become inflamed, while in others the glandular elements are principally affected. It is probably with the view of pointing out this differentiation that the distinctive nomenclature applied to the two former varieties of pharyngitis has had its origin. Notwithstanding some authors consider a peculiar diathesis characterises the glandular type, I am unable to recognise any distinction of this kind sufficient to warrant its consideration as a separate disease. The retention, however, of the above terms will serve the purpose of indicating the prevailing condition in a given case of what I shall henceforth speak of as *hypertrophic catarrh of the pharynx*.

The special object of these introductory remarks is to

emphasize the fact that chronic catarrh, whether nasal, or pharyngeal, or both, is essentially a neurosis. To avoid any ambiguity associated with this term I would point to the superior cervical ganglia of the sympathetic chain as the specific seat of this neurosis. The arguments already adduced when the "etiology of catarrh" was under discussion will have prepared the reader for this issue, as it was then shown how these sympathetic centres control the circulation of the affected area, and how by their inherent defect, the area in question comes to be the "part of least resistance." A patient thus constituted I regard as possessing a *catarrhal diathesis*, but it must not be inferred because my present subject is limited to the naso-pharynx, that the *weak* area is of necessity thus circumscribed, for it often embraces also the larynx and trachea, with the adjacent respiratory tract.

Having premised thus much with regard to the first two forms of pharyngeal catarrh, it remains only to indicate here that the third form, pharyngitis sicca, presents an opposite state of things to the preceding, viz. a gradual deterioration or atrophy of the tissues implicated. It will now be seen that the several phases of the disease divide themselves sharply into two groups, viz. chronic hypertrophic, and chronic atrophic catarrh of the naso-pharynx; either phase of which may separately constitute the condition known as post nasal catarrh, or may be complicated with additional lesions to be considered under their respective heads.

Chronic Hypertrophic Catarrh of the Naso-Pharynx.

The *simple* or *non-follicular* variety of the disease may remain after an acute catarrh involving the nose and pharynx, or it may appear as the sequela of a succession of such acute attacks. Frequently however it is insidious from the outset. In these latter and more inveterate types of their class the disease advances slowly over many years. From quite an early period of life these patients have been conscious that something was wrong with their nose: thus breathing through it is more or less difficult, leading them to respire through the mouth, which is usually somewhat open, though buccal respiration is not so marked a feature as in some other affections of this region. There is excessive secretion, as well as defective vocalisation. After a time of variable duration, these symptoms undergo a change. The patients who have hitherto been addicted to frequent and strong efforts to clear the nares, find they scarcely require to use a handkerchief at all, and the attacks of sneezing which formerly were frequent may cease altogether. They now experience an irritation at the back of the nose, with a desire to hawk and clear away mucus from the throat, which necessitates frequent expectoration—all of which symptoms are more troublesome in the morning.

The meaning of this change is that the anterior nares have become permanently occupied as regards the lowermost channels with hypertrophied mucous tissue, and other

hyperplasias to be described subsequently, which prevent the forward drain of the secretions, obliging these to escape at the posterior outlet. Here the discharge trickles on to the velum exciting those efforts for its expulsion already referred to. In some rare cases a drop of mucus falls into the larynx and impinging upon its posterior wall excites violent spasmodic cough, the cause of which may be quite unsuspected. Such portions of the secretions as get lodged in the interstices of the spongy bones, undergo a partial desiccation by evaporation, and are reduced to a tenacious sticky mass, very difficult of removal. For though the inferior meatus become obstructed as above described, the higher nasal channels usually remain more or less free for the passage of air. This inspissated mucus becomes adherent to the surfaces about the choanæ, and decomposing imparts a peculiarly offensive odour to the breath. The term *ozœna* is often wrongly applied to these cases; it should be limited to disease of the ethmoidal, frontal, and sphenoidal cells.

On *inspection* of the faucial region— that of the nasal region being separately considered later on—there will be encountered one or more of the following conditions: thickening of the pillars of the fauces, more especially the posterior ones; also of the soft palate accompanied with a lumpy and elongated uvula; and possibly enlarged tonsils. Behind these the posterior wall of the pharynx is seen to be likewise hypertrophied; its surface though fairly uniform, is more or less spongy to the touch, and presents a number of congested vessels ramifying irregularly over it. In the more persistent cases, the local phenomena are confined

almost entirely to the pharynx proper: it thus happens that they are often overlooked by an examiner who limits his observation to the soft palate and tonsils.

In consequence of the general increase in the substance of the tissues, the space between the soft palate and the pharynx by which air passes into the nares is much narrowed, and when its muscles contract as they are apt to do during inspection, a mass of thickened mucus is extruded from above, towards the mouth. When all the foregoing conditions are combined it will be impossible to gain any information respecting the state of the post-nasal space by posterior rhinoscopy. As soon as this method of examination becomes available, as after reduction by treatment, or when the disease is confined to the pharynx proper, a corresponding state of things to that already described will be found throughout the naso-pharynx. The tissues generally will be infiltrated and reddened, especially the salpingo-pharyngeal folds, which extend downwards from the Eustachian orifices, while the latter are swollen and blocked with mucus. The pharyngeal tonsil participates in the general swelling, its segments being more pronounced than they should be, and masses of sticky mucus hang from its crypts. The recesses of the choanæ are likewise seen to be occupied with adherent and decomposing secretion.

There is little constitutional disturbance attending this state of things, though these patients can seldom be said to present a perfectly healthy appearance. The voice loses its ring and timbre, and is thick and unmelodious, but this seldom amounts to a nasal twang, because of the partial

patency of the breathway through the nose. The patient himself is troubled chiefly with the irritating efforts to clear away his secretions which are never wholly successful, though on rising in the morning they may cause retching and vomiting.

Deafness to a marked extent is commonly present in these cases, and arises from interference with the tube function. The nature of this interference is now seen to possess a threefold character: 1st the *catarrh of the tube* itself, and the hyperplasias about its orifice. The exaggerated folds of mucous membrane, both those already referred to, and others which project from the lateral walls of the phayrnx, are especially obstructive to the entrance of air. These may occasionally be seen—and opportunities of observing the occurrence are met with where a partial loss of the palate veil allows of very complete inspection under the subsequently acquired conditions of chronic catarrh—to be carried upwards by the contractions of the levator palati muscle, so as to form in conjunction with other hyperplasias of the part, a cushiony mass, which covers the tubal orifice in every act of swallowing. To these conditions must be added a catarrhal hypertrophy of the pharyngeal tonsil, especially in that part of it which belongs to the posterior wall of the pharynx, rather than to its vault. This must not be confused with post-nasal vegetations, though its presence imparts a velvety sensation on examining with the finger which may easily be mistaken for the latter.

The 2nd cause of deafness resides in the *state of the nose*, when its inferior meatus have suffered occlusion from the presence of hyperplasias connected with the inferior tur-

binated bone, or septum.. These as already stated imply tubal obstruction, so far as they hinder access of air to the tube. But any considerable degree of nasal stenosis exercises a more positively injurious influence on the middle ear; because, as Lucae points out, every act of swallowing under these circumstances has the effect of drawing air *from* the tympanic cavity, and is accompanied by a corresponding in-drawing of the drum-head. There occurs in fact, a constant repetition of Toynbee's experiment, in which swallowing is effected while the nostrils are closed by the fingers, and during the performance of which the experimenter is conscious of an inward movement of the drum-head. The persistence of the influences here referred to can only eventuate in complete collapse of the drum-membrane, and the concomitant series of middle ear lesions characteristic of this occurrence.

The 3rd factor in the production of deafness is presented by the *paretic state of the palato-tubal muscles*, which co-exists with, and even precedes, the foregoing coarser manifestations of catarrh. Its cause resides in the vaso-motor deficiency, or ganglionic neurosis, already insisted upon as the starting point of the disease. The immediate consequence of this neurosis, it is necessary to repeat, is a permanently dilated state of the blood-vessels in the area implicated. As the palato-tubal muscles possess motor nerves having nutrient vessels within their sheaths, these vasa nervorum participate in the engorgement common to the rest of the series, with the effect that the pressure thereby induced interferes with the motor function of their fibres. The muscles supplied by such intrinsically compressed nerves respond imperfectly

to stimuli from the first, as shown by the relaxed state of the palate, and the defective action of the dilator tubæ muscles. From the latter cause slight deafness will in many cases be found to precede the coarser indications of catarrh: but though slight at first it progresses surely, only, however, attracting the notice of the patient when intensified by the accession of the mucous tissue hypertrophies already described.

It is to the careful observations of Dr. Weber-Liel of Berlin that otologists are indebted for the first intimation of the occurence of these muscle pareses in catarrh, and though his work on "Progressive deafness" was published early in the last decade, it has by no means attracted the attention it demands. This author also pointed out an indication of the presence of tubal paresis elicited by catheterisation, the correctness of which in these cases I have repeatedly verified. It is as follows:—When air is injected through the catheter it cannot at first be made to enter the middle ear, but if the attempt be persevered in, it is heard suddenly to pass quite freely, in response to one particular pressure of the bellows. After this single success every subsequent attempt to repeat it fails. The reason of the one inflation only succeeding is that it happened synchronously with some automatic muscular movement on the part of the patient, such *e.g.*, as is implied in the acts of swallowing, coughing, speaking &c. which by dragging upon the membranous portion of the tube momentarily expands its lumen, after which it collapses and becomes again impervious.

The foregoing explanation of the *origin of catarrhal paresis*

in the extension of the vaso-motor deficiency to the nutrient vessels of the muscle nerves, is I submit the correct one for these cases of "progressive deafness"; it is part of the phenomena due to the same vaso-motor defect as induced the hypertrophies in the mucous tissues of the correlated area, and affords another illustration of the "uniformity of type" discernible in all the features of the disease.

Treatment of Simple Hypertrophic Catarrh of the Pharynx.

Treatment of the pharynx must be initiated by the local application of detergents to cleanse the region of secretions, adherent or otherwise. Warm alkaline solutions applied by means of sprays through the nose, and behind the soft palate, will accomplish this object. The method of performing it has been already described; as then stated, the formula I consider best adapted for the purpose, is the following:—

℞ Sodæ bicarb. ℥ ss.
Acid. carbol. ʒ ss.
Aquam ad Oj. ft. Lotio.

It is to be used warm. The warming may be most conveniently accomplished by pouring the quantity immediately required into a small bottle, and immersing it for a few minutes in a larger vessel containing hot water.

Should the faucial tonsils require to be ablated or the uvula to be reduced in size, these operations should be performed as early as possible, because the bleeding con-

sequent thereon will favour the subsequent treatment, and considerably curtail its duration.

Ablation of the tonsils should only be practised when these organs have undergone considerable change of structure, whereby they are converted into firm masses, the surfaces of which are roughened by prominent ridges of hypertrophied fibrous tissue derived from the stroma of the tonsil, separated by depressions where the lymphoid tissue has been lost during previous attacks of inflammation. The presence of such a hard rough tumour seated on each side of the fauces, and rubbing against the pharyngeal wall with each act of deglutition, constitutes of itself a cause of pharyngitis and sufficiently justifies removal in order to cure the latter. Objections to this proceeding whether based upon the fear of consequent arrest of development in the ovaries, increased liability to take cold, interference with vocalisation, &c.—are alike chimerical; they can be explained only by predicating on the part of those advancing them, a total misapprehension of the nature of the disease to be dealt with.

As regards the plan of operating, I give decided preference to that in which the English tonsillotome is used, as it is instantaneous and almost free from pain. As, however, much practice is required for its efficient employment, the the operator is advised to select those instruments with which he most familiar. When the tonsillotome is used, hæmorrhage is not to be feared. I have only once had a case that gave trouble in this respect. It is a good plan to blow some tannic acid over the cut surfaces with an insufflator, or to let the patient slowly swallow a super-satu-

rated solution of tannin. Afterwards a gargle of permanganate of Potassa, gr. j. to ℥ j. water, keeps the wound and adjacent mucous surfaces healthy; cicatrisation is usually accomplished in less than a week. The more complete the removal of the tonsil, the more rapidly does the wound recover.

As previously stated the *uvula* should never be removed in *toto*, though its reduction, when as occasionally happens, it assumes elephantine proportions, is in every respect advantageous. The best method of proceeding is to take a long pair of scissors, with broad and slightly curved blades, in the right hand and use them first as a tongue depressor so as to bring the uvula fairly into view. Then with the left hand holding a long pair of vulsellum forceps, seize the distal end of the uvula and pull it forwards and downwards. The tongue is now released from the pressure of the blades of the scissors which are rapidly passed above the forceps and made to sever the portion included in the grip of the latter. An instrument called a uvulatome has been devised for this operation; it is a kind of a trap which is placed beneath the member, the operator watching his opportunity to close it when a sufficient length has entered the opening. It is more difficult to use, and less exact in the result than the former method; for which reasons I do not recommend it. Next to limiting the ablation to the redundant mucous tissue, the only other point to be observed is to make the line of severance as nearly as possible in the horizontal plane. This gives a better stump, besides which the wound heals more rapidly and with less pain, than is the case if these details are neglected. It is matter of ex-

perience that cicatrisation is slower, and deglutition more painful after this operation than after ablation of the tonsils.

When recovery from the operative measures just sketched is fairly advanced, local treatment may be proceeded with by lightly touching the entire region involved in the disease with solid nitrate of silver, fused upon a suitably curved aluminium wire. It will be best not to do this at one sitting, indeed it may be impossible at first to touch more than the parts immediately within view. The thickened salpingo-pharyngeal folds of mucous membrane which pass down from the Eustachian orifices to the inside of the posterior pillars of the fauces becoming lost in the sides of the lower pharynx, and any other morbid reduplication of mucous tissue easily accessible, should be firmly pressed with the caustic point. Though not accompanied with much pain, considerable stiffness and uneasiness in the part, follow this application, and do not entirely subside for several days. To relieve these symptoms the patient should be instructed to spray the alkaline solution through the nose, allowing the fluid to escape by the mouth, two or three times daily. In the course of a week the effect will have passed off, with usually much improvement as regards diminution of swelling, permitting the use of the rhinoscopic mirror to direct the treatment above the soft palate. In dealing with folds of thickened tissue in this locality I prefer the galvano-cautery, using for this purpose a properly curved and guarded electrode, of which several sizes should be at hand. As this can be applied cold with great accuracy before the circuit is closed, only the line of tissue

to be destroyed is touched by the cautery, a point which cannot be so satisfactorily secured if nitrate of silver is employed for the purpose: the diffusion of the latter salt though really advantageous, causes the patient more subsequent annoyance than does the cautery. At the same time any tortuous vessels should be destroyed with a touch of the heated wire. All this cannot be effected at one sitting, and the surgeon will be guided in the extent of his measures by considerations based upon the constitution and power of endurance of his patient.

It is necessary to repeat that *deafness* associated with hypertrophic catarrh of the pharynx, can only be relieved by securing the normal action of the Eustachian tubes, and that in nine cases out of ten the cause of their defective functioning is in the naso-pharynx. Direct treatment of the middle ear by catheterisation, &c., can therefore accomplish little until the hyperplasias which block the approach to the tubal orifices have been got rid of, or have been greatly reduced in substance. Treatment of nasal hypertrophies when these coexist, should be conducted step by step with the preceding, but as these possess special features their consideration will be deferred to a subsequent chapter.

In the meantime the vault of the pharynx and choanæ should be sprayed through the mouth with a solution of chloride of zinc, grs. xv—xx to ℥ j water, two or three times weekly. As soon, however, as a brush can be conveniently introduced, the upper pharynx should be mopped over by its means with a solution of arg. nit. ʒ ij to ℥ j water; one such application giving better results than

any milder and more prolonged treatment. It is in this form of simple hypertrophic pharyngitis that nitrate of silver is pre-eminently useful, and probably its utility is confined to it, *i.e.* when syphilis is not a factor.

When by the foregoing measures the more prominent hyperplasias have been reduced, it will be desirable to exchange the alkaline spray used by the patient up to this time, for one of an astringent character. Alum or Ferric-alum, ʒ j to ℥ vj water may be adopted, or this formula, alum ʒ ss, tannin ʒ ss, water ℥ vj, will answer the present purpose.

Certain precautions arising out of this line of treatment should be noted. These have reference to the importance of so regulating the procedures within the post-nasal space as to avoid exciting acute inflammation of the tube or middle ear. The galvano-cautery if used incautiously may do this, though such a result can scarcely happen if its application be carefully guided by the aid of the rhinoscopic mirror. Nitrate of silver, though less effective in reducing hyperplasias, is, provided it be used in the solid form or in very strong solution, free from any such injurious tendency. So with regard to the use of lotions and washes to the region during operative proceedings, which if not properly applied are liable to excite middle ear inflammation. Solution of permanganate of potassa has this tendency in a more pronounced degree than any other, especially if used with a douche or syringe, for which reason I now invariably direct it to be applied through a spray apparatus. To be on the safe side it is desirable that whatever solution is employed for the purpose of irrigation during the stage of active treatment should be thus applied.

The length of time required to accomplish the objects to which the foregoing remarks refer will vary from three to six weeks, and in cases where the hypertrophies are extensive and the conformation of the region renders them difficult of access, even this period may be exceeded. When the mechanical obstructions to normal function both as regards the nose and post nasal space are sufficiently reduced, the first stage of treatment is completed, with the effect usually of much relief to the deafness and tinnitus; especially will the patient acquire a freer breathway through the upper respiratory passages, without which no permanent improvement in the ear symptoms is to be expected.

The patient is now in a position to fulfil the second class of indications, viz. the *restoration of normal activity to the paretic palato-tubal muscles.* This will be secured by local applications of electricity (Faradic), and by constitutional treatment. The former of these is fully discussed in the chapter on "Paretic Deafness" in the second part of this treatise, to which, in order to avoid repetition, the reader is referred for the author's views respecting electrisation of the ear. The latter will be effected by the internal administration of cod-liver oil, iron, strychnia, and the hypophosphites. "Fellows' syrup of the hypophosphites" is an especially useful combination in the debility associated with chronic pharyngeal catarrh.

Nor should the views of the neurotic origin of the disease to which expression has been given discourage treatment, because it is never possible to say to what extent the neurosis has advanced in a given case. For example it may amount only to an exhaustion of nerve power on the

part of the vaso-motor centres, and so far be a functional defect capable of removal by judicious effort. It is probably only in the very persistent, almost life-long duration of the atrophic phase of the disease that we are confronted with organic changes in the ganglia or their branches.

Follicular Hypertrophic Catarrh of the Pharynx; or Follicular Pharyngitis.

This term, *Follicular Pharyngitis*, subserves the useful purpose, already insisted upon, of indicating the fact that in it the inflammatory and hypertrophic phenomena are focussed as it were, in and about the glandular structures of the region. Though generally seen most distinctly on the posterior wall of the pharynx it is by no means confined to this locality, but may appear in the larynx, gullet, pillars of the fauces, and post-nasal space; wherever, *.e.* these gland structures exist to manifest the disease. The appearances are very characteristic. Small red nodular prominences stud the surface, often surrounded with a zone of injected vessels, thickly grouped, or sparsely distributed upon the otherwise comparatively healthy mucous membrane. Occasionally a follicle is choked with the debris of its excessive activity, and this accumulating in the distended duct, forms a whitish spot on the summit of the nodule. This occurrence has demanded another name, and hence we have "*exudative pharyngitis.*"

The *symptoms* are referable in a great degree to the situation of the inflamed follicles. For, while a considerable

batch seated on the immoveable posterior wall of the pharynx will create scarcely any disturbance (the patient being ignorant of its presence till pointed out by the examiner), one such small centre of irritation placed upon the posterior pillar of the fauces, or wherever the movements of the locality are capable of indicating its presence, will give rise to acute pain on speaking or swallowing. From this cause there is sometimes an irritating sense as of a hair being entangled near the root of the tongue, exciting constant swallowing efforts, which from the circumstances of the case are ineffective to afford relief. A frequent dry cough with soreness and stiffness in the throat are commonly present, and if associated with an occasional appearance of blood in the scanty sputa, the cause of which as already explained may be due to the rupture or abrasion of a follicle, the gravest apprehensions may be excited on the part of the patient or his friends. The voice is hoarse, and talking becomes fatiguing and painful when the larynx is implicated. This form of pharyngitis is less likely than either of the others to involve the Eustachian tubes, and therefore is not so frequently a cause of deafness as they are.

Notwithstanding this disease has considerably exercised the authors who have studied it, it appears to me to admit of a different elucidation to any hitherto offered. Mackenzie, whose description is as usual lucid and exhaustive, insists strongly on a "constitutional delicacy" as the underlying factor in its production. But except the always possible "strumous diathesis," and the frequent occurrence of the disease "amongst those using the voice, such as the

clergy, singers, hawkers, and costermongers," it is not stated by him in what this particular "delicacy" consists.

As the reader will infer from what has already transpired, I regard the naso-pharynx and adjacent regions of these patients as their *parts of least resistance;* this condition arising from inherent defect in the vaso-motor centre presiding over the circulation of the least resistant area, the vessels of which are always deficiently inhibited, and therefore chronically hyperæmic. This is the reason why such patients take cold on the slightest provocation. As thus stated, the foregoing enunciation does not explain why some subjects develop a general pharyngitis, with hypertrophy of all the tissues, and others show it only in the follicular elements of the region.

To understand this divergence it is necessary to assume for the present what I believe to be a fact in connection with the distribution of vaso-motor (efferent) nerves—viz. that every distinct histological structure has special corpuscles in the ganglion assigned for the regulation of the blood supplied to it, and with which set of corpuscles the nervi-vasorum of such special structures are severally connected. It thus comes to pass that though in a tissue area comprising many complicated organisations quite distinct from each other all of which are supplied with branches of the same artery, yet is each differentiated as regards impressions affecting its individual blood-supply, from contiguous but histologically distinct structures, by the special corpuscular connections of the nervi-vasorum of each in the ganglionic centre. Thus it is provided that the circulation of the follicles, *e.g.* in a given area of mucous membrane, may be in

quite different conditions of tonus to that of the connective tissue in which they are seated.

If this be so it is only necessary to predicate that the ganglionic cells generally have suffered in the one set of cases, while certain groups only are so depreciated in the other set. In the former instance, all the tissues innervated by the ganglion will manifest disease; in the latter, those only which correspond to the more limited series affected will indicate this by alterations in their nutrition. Parallel states to those just referred to are commonly observed in pathological sections taken from various parts of the nervous system.

The foregoing hypothesis is not advanced to meet the case now under discussion, but was forced upon my conviction at an early period in the study of certain cognate subjects; more especially in connection with the skin phenomena of the exanthems. Its further discussion would be irrelevant to my present purpose, though by whomsoever accepted it will serve to illustrate that "uniformity of type," which in the introductory chapter was stated to attend all the morbid processes to the study of which this treatise is directed. On other grounds I would ask for this view a tentative acceptance, for by its means alone will be solved the phenomena now dealt with, as well as others to be subsequently discussed.

Apart from the question of theory, there is no doubt that follicular pharyngitis has a pronounced tendency to become chronic, in like manner to its congener—simple pharyngitis—either subsequently to an acute attack, or insidiously without such an antecedent stage; and further

that this tendency to chronicity is more marked in some patients than others. Those manifesting it possess the catarrhal dyscrasia, and by whatever theory we account for it, the fact remains that a source of relief to the system having been found, this becomes permanent, because the excretory follicles of the locality suitably subserve the purpose, which is fostered by the initially feeble inhibition of their vascular supply. The follicles thus acquire the habit of doing more work than normally falls to their share, on account of the permanently dilated and hyperæmic state of their vessels. Thus the influence of the part of least resistance operates to favour excessive secretion with hypertrophy of the organs performing it, in response to the continuous exaggeration of their blood-supply.

The inferences as regards *treatment* are—to obliterate the local lesion, and restore the vessel equilibrium by resuscitating the exhausted nerve centres. In other words the treatment resolves itself into local and constitutional measures. The latter object is accomplished by the same means as have been described as applicable to simple chronic pharyngitis; it remains therefore to consider the *local* treatment only. This is comprised in the destruction of each enlarged follicle individually. Various measures are equally applicable for this purpose. Our American confréres favour the method of touching the nodule with a stout wire heated to dulness. Mackenzie prefers the London Paste, applied to the mass on a blunt pointed stick, with the precaution of swabbing or gargling immediately thereafter with weak vinegar and water. A convenient method is to touch each point selected for destruction with

a fine galvano-cautery wire. Each method is effective and almost painless, but in either, speaking generally, several sittings are required, the amount of tissue destroyed at any one time being proportioned to the requirements of the case. In the meantime a detergent gargle of Permanganate of Potassa will facilitate the separation of the sloughs, after which recovery is rapid. Long continued management on the lines already indicated, may be required to prevent subsequent irruptions of the catarrhal proclivity.

Chronic Atrophic Catarrh of the Naso-pharynx; or Pharyngitis Sicca.

The third form of the disease, dry catarrh of the naso-pharynx, consists essentially of a sclerosed, thinned, or atrophic state of the mucous tissues of the affected region. Etiologically, it may be regarded as the outcome of the preceding hypertrophic stages of catarrh. But its advent is liable to great variations. Thus, while in some cases we may observe the patient pass through the various phases of acute cold, followed by hyperplastic developments, and ending in sclerosis, in a comparatively brief period; it is more common for these changes to occupy many months, or even years, in their successive evolution. In the worst type of the disease the subject is unable to afford any history of the kind above indicated. He will be unable to recall any particularly violent attack of cold which proved the starting point of his trouble, but will say rather that he has never been free from annoyance in his nasal region,

the course of which has advanced insidiously from an early period of life.

On inspection through the mouth the soft palate is usually seen to be very thin and flaccid, often sticking to the posterior wall of the pharynx, while the uvula is reduced to the smallest dimensions. The pharynx itself presents a dry shining glazed appearance; its mucous membrane is obviously reduced in substance, so much so that in confirmed cases it is possible to see the fibres of the constrictor muscles through it. Its surface is streaked with patches of thick tenacious mucus. The rhinoscopic image is remarkably distinct, the terminations of the Eustachian tubes standing out in bold relief, while the posterior ends of the lower turbinated bones are shrunken to much smaller dimensions than in the healthy state. Patches of thick inspissated mucus adhere to these and obscure their contour until removed by washing and swabbing, while Rosenmüller's fossæ are filled with similar nauseous-looking material.

Inspection through the anterior nares reveals a capacious cavern on each side of the septum, allowing the posterior pharyngeal wall to be readily illuminated by light thrown in from the front. The anterior portion is dry, but the presenting surface of the middle turbinated bone and the recess it covers, are occupied with the tenacious secretion above mentioned. The nostrils in fact afford marked evidence of the atrophising character of the morbid processes at work in them. Not only is this the case in the mucous membrane, but the spongy bones participate in it, being much less prominent than in health.

Bosworth has offered an explanation of this wasting of the turbinated bones, on the hypothesis that the secretions which cover them, owing to their inspissated character, contract on the underlying tissues and so exert sufficient pressure to cause their absorption—a view which does not appear to satisfy the requirements of the case. To my mind the more consistent explanation is that which refers the wasting of the osseous structures to the same cause as that which induces that of the mucous membrane, viz., the central or reflex vaso-motor defect, entailing mal-nutrition throughout the diseased area.

Most instructive is the state of the *Eustachian tubes* when, as is usually though not always the case, they are involved in the morbid process. The evidence of their atrophised condition extends to the muscular apparatus pertaining to them, as well as to their mucous lining. Thus air can usually be made to enter through the catheter, but the flaccid membranous portion collapses immediately thereafter, and does not readily re-open. In one patient the left tube was in this the usual condition, while the opposite one remained persistently patent. To such an extent was this the case that when the otoscopic tube connected my ear with that of the patient, the breath sounds, distinct for inspiration and expiration, were very audible. The *tympanic cavity and drum-head* present the conditions of atrophic catarrh also, *i.e.* sclerosis of their tissues generally. The outer membrane is relaxed, and depressed upon the ossicles, but though readily replaced by inflation of the cavity, such rectification of its plane is not usually attended with improvement of hearing power.

Reviewing the foregoing conditions, it appears difficult to regard them in any other light than as due to a vaso-motor neurosis which is the fundamental factor of the disease. In this relationship it is of interest to note that the ear is not always implicated in dry catarrh of the pharynx; and on the other hand the organ of hearing may be the only region exhibiting the disease. For there can be little room for doubt that the pathological genesis of pharyngitis sicca and that of chronic non-suppurative catarrh of the middle ear, differ only in respect of the locality manifesting the disease. That the ear affection should exist independently of that of the throat, or *vice versa*, is intelligible on the hypothesis propounded in this treatise; because a large part of the tympanic circulation, that derived from the middle meningeal artery, derives its efferent vaso-motor nerves from the otic ganglion, and not from the superior cervical which is concerned with that of the naso-pharynx. And it is this difference of vaso-motor relationship that determines the variations of nutrition in organs supplied from a common arterial source—as already explained.

There yet remains the question, what is the pathological state of the vaso-motor system which gives rise to *atrophy* of the tissues in its efferent areas? Hitherto I have referred to this as a neurosis only, because its exact nature is not so readily determined as in the case of dilator conditions attended with the opposite state of hypertrophy. Is the nerve lesion productive of atrophic catarrh, central in the sense of being due to complete withdrawal of vaso-motor function in consequence of annihilation of the corpuscular elements of the ganglion? Owing to the regret-

able neglect of post mortem examinations of the ganglia we can only arrive at inferential conclusions on this point. These would seem to negative the suggestion just offered, because in the case of exophthalmic goitre quoted in the introductory chapter, in which the ganglia were found to be either completely or partially destroyed, the vessel phenomena were dilator in character, with resultant hypertrophy of tissue in the correlated areas. Hence arises the question, is the condition of atrophy a reflex one, having analogy with the atrophic sequelæ of injuries to nerves as witnessed in the extremities, or seen after extensive burns of the integument in the form of duodenal ulcers? This latter suggestion may perhaps bring the subject within the range of parallel observations. But if thus reflex, where is the excitor lesion situated? and what is its nature?

It is only approximately, in the present state of our knowledge, that one can venture on any solution of these queries. Guided by the principles attempted to be formulated in the introductory chapter—when some reasons were adduced for concluding that atrophy of tissue followed upon persistent afferent irritation—I would tentatively only, make the following suggestion. At some very early period of these patients' history—possibly during an exanthematous fever—the tissue nerves of the pharynx contributed by the superior cervical ganglia have suffered an ill-understood change, by reason of which their afferent function is thereafter modified; *i.e.* they convey perverted impressions from the tissue to the ganglia: these excite contractor impulses in the efferent nerves with which the former are in reflex relationship, viz., the vaso-motor

branches of the ganglia distributed upon the vessels of the pharyngeal mucous membrane. Hence mal-nutrition follows in this the correlated area. Whether the tendency to this defect is congenital, and what are its exact conditions, are questions which must for the present remain unanswered.

Symptoms—Besides the objective states already described, there are, more especially in the early stage of the disease, much coughing and hawking with strong swallowing efforts, consequent on the presence of secretions and the irresistible desire to expel them. At a later date when general anæsthesia of the region has supervened, and the glandular structures have become atrophied to a greater or less degree, these symptoms are much diminished. It may, however be a long period, reckoned by years, before this result is arrived at, and during this time the sufferings of the patient, as much mental as physical, from the above cause are extreme. In neglected or inefficiently treated cases the secretions accummulate in the post nasal region to an extent which would scarcely be credited by those who have not become cognisant of their presence by rhinoscopic inspection. A typical instance of the annoyance arising out of this circumstance occurred in the case of a young woman who stated she was compelled to have recourse to a "button-hook" to assist in removing the tenacious shreds which threatened to suffocate her unless in some way disposed of. The *breath* of necessity becomes tainted in passing over this putrescent mass, and though not positively ozœnic in character, is sour smelling and repellent. The senses of *smell* and *taste* are necessarily

blunted, and in some cases quite lost. The *voice* becomes modified, losing its timbre, and though neither nasal nor guttural, possesses a harshness of character that is the reverse of pleasant to the hearer. The *singing* voice is always lost, a circumstance not entirely due to the laryngeal complications which may co-exist with the disease. *Asthma*, and so-called *hay-fever*, are occasional concomitants of the disease, as may indeed be the case in every form of naso pharyngitis. It is seldom, however, that the post nasal region is thought of in this relationship. *Deafness* is nearly always present, the associated ear disease being, as already stated, that known as dry catarrh of the middle ear. Neither tinnitus nor giddiness is so frequent as in the hypertrophic catarrhs of this organ.

Treatment of Atrophic Catarrh of the Pharynx.

If the views respecting the neurotic element underlying this disease be accepted, the difficulty of treating it successfully will be readily understood: it is one which experience shows to be very real, taxing alike the intelligence of the surgeon and the perseverance of the patient. The first principle is to secure perfect cleanliness of the nasal fossæ and adjacent parts. This will be accomplished by anterior and posterior nasal irrigation with the alkaline wash before mentioned. By practice, a patient of ordinary intelligence may be taught to fill these cavities with the fluid and retain it for several minutes, so securing the maceration and loosening of the secretions, whereby their subsequent removal is

facilitated. To do this, the nasal syringe—an ordinary 2oz. syringe fitted with a conical nozzle of soft-rubber—charged with the warm lotion, is introduced air-tight into one nostril, the instrument being held in the horizontal plane: the other nostril is compressed, the mouth widely opened, and the head inclined somewhat backwards. The patient then gently propels the fluid into the nares, only so much being injected as can conveniently be accommodated; meanwhile he should breathe steadily through the mouth. When further retention is impossible, the finger compressing the one nostril is removed, allowing the already injected fluid to escape, while the syringe is slowly emptied into the other meatus. This proceeding should be repeated two or three times, and finally a post-nasal washing should be practised.

In confirmed and neglected cases it is at first necessary to carry out this treatment at least three times daily. Later on, these irrigations settle down into a night and morning "function" to be performed with the same regularity as the rest of the patient's toilet. If he reside at the sea-side, which when practicable he should do, warm sea-water may be advantageously substituted for the alkaline lotion. When this is not possible, tincture of iodine may he added to the latter in the proportion of half a drachm to the pint.

The next principle to be observed in the local treatment is the application of suitable stimulant and emollient remedies. In a certain number of cases Iodoform dissolved in Ether is of essential service; in others it appears to do little good. The following formula is most efficient:—

Iodoform ʒ j.
Ether (Sp. gr. ·72) ʒ j.

Half a drachm to be applied by means of a spray apparatus twice in the week, or (by means of a brush) to the anterior and posterior nares and pharyngeal walls. A small portion of Iodoform wool should be introduced into each nostril, after the night and morning irrigation. Besides its medicinal effect it serves usefully to modify the temperature, as well as acting as a filter to the respired air. In those cases where the stiffness, sense of dryness, and general discomfort experienced at the back of the nares are not relieved by the above, it becomes necessary to adopt other measures. In fact few diseases demand such a multiplicity of resource as the one under consideration. For some time past I have found an oily basis as a vehicle for other remedies of essential service in relieving the symptoms just referred to. In selecting such an oil, stability of composition is a paramount point, as a tendency to rancidity through developing fatty acids, would add to the sources of irritation. After several trials a derivative of petroleum called *Adepsine oil*, furnished me by Mr. Bullock, has proved eminently satisfactory. It readily combines with certain volatile and essential oils which lend themselves to the therapeutics of the disease, and being very diffusible finds its way into the remotest crevices of the region, when sprayed through the nose or behind the soft palate. Combined with it I use the oils of Cubebs, Sandal wood, Eucalyptus, and Scotch pine, in the proportion of one part of either of the preceding to 100 of Adepsine oil. From half a drachm to a drachm of this mixture warm, is applied by means of a spray apparatus, twice daily. It usually produces marked relief to the soreness and stiffness of the

part, and is very acceptable to the patient. A portion of frayed out cubebs wool may be advantageously introduced after the spraying.

Before using any local remedy it is necessary to see that the surfaces are free from mucus, which if present should be removed with the cotton holder.

Nasal Irrigation.

Frequent mention has been made in the foregoing remarks of the application of detergent or cleansing lotions to the cavities of the nose, and this fundamental principle of treatment has been spoken of as "nasal irrigation." Various methods of carrying out this proceeding are in general use, several of which, such as the anterior and posterior sprayings and syringings have been already described. The plan which I find most generally applicable for continued use is that in which the lotion is simply sniffed up the nose from the patient's hand; a spoon, saucer, or piece of sponge, being occasionally made use of to facilitate the process. It sometimes happens, however, that patients are quite unable to avail themselves of this method. As the muscular effort attendant upon the act of sniffing secures a more general application of the fluid to the recesses of the nasal cavities than can be affected by any other method, I have sought to retain these advantages while rendering the

proceeding an easy one to the most inept individual, by the use of the simple appliance figured below:—

It consists of a glass tube the centre of which is blown into a bulb for holding the fluid, the arms curving upwards

FIG. 7.

Author's Nasal Irrigator.

rom the expanded portion sufficiently to retain the fluid. The end of one arm is funnel-shaped to aid the charging of the instrument, the other is tipped with a soft rubber nozzel of suitable size and shape completely to close the nostril when introduced. To use this appliance it is sufficient to insert the rubber-tipped end into one meatus as above directed, the other meatus being closed by a finger of the disengaged hand; the patient then raises the bulbous portion until the fluid is felt in the nose; he then inspires forcibly when the contents are drawn inwards, passing into the pharynx, and are readily expelled through the mouth.

CHAPTER IX.

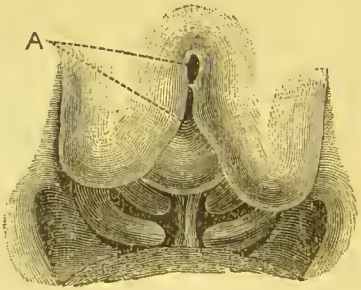
SIMPLE HYPERTROPHY OF THE PHARYNGEAL TONSIL.

Simple hypertrophy of the Pharyngeal tonsil is comparable to the analogous condition of the faucial tonsils, and frequently coexists with the latter. It possesses considerable interest in this relationship from the fact that the symptoms for the relief of which the enlarged faucial tonsils have been removed may persist after the operation, their permanence being due to the morbid state of the post-nasal organ. The disease is met with in early life, either alone or complicated with post-nasal vegetations. In the simple form it is readily distinguished by characteristic features, perceptible both to sight and touch. Explored by the finger a smooth rounded resisting mass is felt in the vault of the Pharynx, encroaching upon the choanæ so that the upper boundary of the posterior nasal fossæ cannot be defined :—thus the sensation imparted to the touch is markedly distinct from that which is felt when post-nasal growths are encountered. Viewed in the rhinoscopic mirror the appearance is that represented in the accompanying illustration, copied from a boy aged 15 years. It presents a solid-looking rounded mass filling up the vault, overlapping the choanæ in front for a distance of a third of an inch and laterally projecting over Rosenmüller's fossæ so as to come in contact with and press upon the Eustachian orifices. In the median line is a faint indication of division and in this line are seen two deep crypt-like depressions, shown at A. These latter were quite unintelligible to

me at first, but as the mass diminished under treatment these fossæ enlarged and at length merged in each other, showing them to be simply gaps left between the swollen halves of the gland where the latter did not quite come into apposition.

When fully established this condition of chronic enlargement of the Pharyngeal tonsil is no more disposed to subside than is the corresponding state in the better known region of the fauces. Its chief interest lies in the interference it exercises upon the function of the Eustachian tubes which are compressed by it. Hence it becomes an important cause of deafness, though in a limited number of cases. The patient who furnished the annexed illustration dated the commencement of his illness from a severe cold

FIG. 8.



Chronic hypertrophy of pharyngeal tonsil showing symmetrical enlargement of both segments of the organ; also a third or supernumerary portion between and below these. Drawn from life.

acquired four years previously. This patient exhibited in the superadded conditions a typical presentment of hypertrophic catarrh of the naso-pharynx. Thus there were in

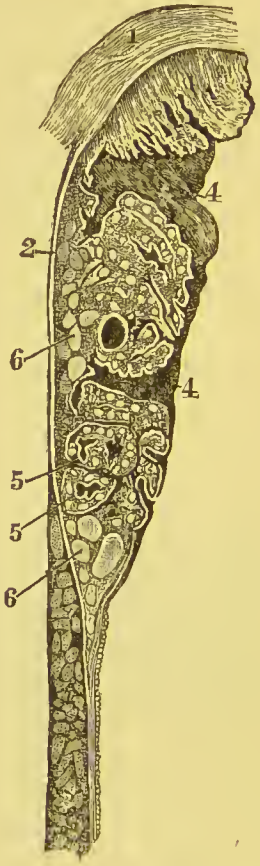
addition to the above described tonsillar hypertrophy, a generally diffused rhinitis, with thickened and spongy state of the mucous covering of the inferior spongy bones in front; frequent, almost daily recurring epistaxis; marked deafness on both sides, the hearing distance for the right ear being $\frac{9}{40}$, and for the left on which side the Eustachian tube was more encroached upon by the tumour it was $\frac{2}{40}$ only; tidal tinnitus; occasional giddiness; both membrana tympani depressed and dull-looking; numerous folds of thickened tissue projecting from the lateral walls of the post-nasal space; Eustachian tubes impervious to Politzer's inflation. In addition to these there existed a small bilateral soft bronchocele.

Treatment.—Although it is possible to effect some slight subsidence in the enlargement of the pharyngeal tonsil by the repeated application of such styptics as nitrate of silver, solution of chloride of zinc, &c., this method of treatment gives only a partial result, and requires a long period to accomplish even this. Evulsion of the mass is the only measure in which confidence can be placed. The choice of methods for accomplishing this object lies between the cutting forceps, the galvano-cautery, and the wire snare. Resort to the former for certainty of result, and rapidity of execution, has in my opinion no rival plan. A mass as large as a cob-nut may be removed at one coup, and if necessary a second mass, by successive introductions of the pharyngotome figured in the next chapter. The directions for using this instrument are the same as there given. No evil consequences result from this operation, and with the completion of cicatrisation all trace of the

disease is obliterated. Should other hypertrophic complications coexist, these must be treated on the lines already indicated.

How far the *Hearing power* will improve after the removal

FIG. 9.



Vertical section of normal pharyngeal tonsil, after Luschka.

1. Basilar fibro-cartilage. 2. Internal pharyngeal fascia. 3. Superior constrictor muscle of pharynx. 4. Lacunæ of tonsil. 5. Section of single capsule with follicles in wall. 6. Acinose mucous glands.

of such mechanical obstacles as are now being discussed, depends of necessity on the extent to which the middle ear has been implicated by their presence. In the majority of cases a course of treatment directed to the tympanum, on ordinary otological principles, will be required to supplement the operation, which is thus to be regarded as the initial step in the management of the case.

CHAPTER X.

LYMPHOID PAPILLOMATA OF THE NASO-PHARYNX, OR POST-NASAL VEGETATIONS.

Previously to the appearance of the second edition of this work in 1880 in which the subject of post-nasal vegetations was fully discussed, there did not exist any original monograph upon the subject by an English Surgeon. This fact may perhaps be accounted for by the remark of a German physician to the effect that in England he observed that doctors did not "interrogate the nose". Be this as it may, the fact remains that in this country we are indebted to Meyer of Copenhagen for first calling attention to it, in a paper published in the *Proceedings of the Royal Medico-Chirurgical Society*, October 1869. It is true, this communication did not attract the attention it deserved, both on account of the scientific standing of its Author, and the practical value of its teaching. The subject in fact lapsed into obscurity, so far as this country was concerned, for a full decade: the only mention of post-nasal vegetations during this interval, occurs as brief abstracts of Meyer's paper in several Encyclopædic works published in the meantime. In 1878 Loewenberg of Paris issued an exhaustive treatise on the disease, a translation of which appeared in the "*Medical Press and Circular*" for 1879. Since this period there has been an increasing recognition of its prevalence both in America and at home, an awakening largely stimulated by the elaborate discussion which

the subject received in the Laryngological section of the International Medical Congress held in London in 1881.

In this historical connection, it should be recorded that Sir Andrew Clark was probably the first in this country to draw attention to the post-nasal space and its contents, as the seat of certain little recognised diseases. His contribution to the subject appeared in the "*London Hospital Reports*" for 1864, and in it the important statement is made, as the result of experiment, that the normal secretion of the pharyngeal tonsil is competent to convert starch into sugar.

The following remarks are based upon an experience of upwards of three hundred cases, which have come under my observation during the last seven years in hospital and private practice. The disease consists in the presence of a number of growths or excrescences occupying the post-nasal space. They may be confined to the vault of the pharynx, or be scattered indiscriminately over the boundary walls of the region. They are pedunculated or sessile; the former are nodulated or flattened, varying in size from a split-pea to a horse-bean; occasionally they attain much larger proportions. They often present a curious foliated arrangement, so that when removed entire they may be opened out into two or three plicæ, the divisions penetrating a chief portion of the whole mass, figs. 11 and 12, A A. These tripartite processes assumed in one instance a remarkable resemblance to digits, the mass as a whole, of which the figure (12) is a faithful copy, looking very like a foot with three large toes.

The sessile growths are found chiefly upon the posterior wall of the pharynx, but whether sessile or pendulous it is

rare for them to occur so low down as to be visible unless the soft palate be raised, or the rhinoscopic mirror be used to inspect them. They may be few in number, and scattered

FIG. 10

Specimens of growths of average size, after removal.

FIG. 11

FIG. 12

Larger growths showing tripartite divisions at A A.

in situation, or be so abundantly developed as completely to fill and distend the post-nasal space. In this maximum phase they completely obliterate the post-nasal

space as an air cavity, and cause its moveable floor constituted by the soft palate, to project forwards towards the mouth. They vary in consistance as much as in size, some being soft and gelatinous to the touch, whilst others are firm and resisting. They usually bleed readily when subjected to palpation. In a certain number of cases there is superadded a soft velvety condition of the underlying and adjacent mucous membrane, which in the neighbourhood of the choanæ developes into a villous fringe, of itself sufficient to obstruct respiration. This condition when present has an important bearing on the treatment, and will be again referred to in this connection.

Pathology. Microscopically, these structures consist largely of lymphoid tissue surrounding a feebly indicated connective-tissue basis. When quite fresh they exhibit a limiting arrangement of fusiform epithelium, though this is often lost if the totality of growths be large, owing probably to the compression of the mass in the limited space which forms their habitat. Further there is traceable in each segment of a growth, the ramifications of a minute artery and vein, which enter at the root and spread throughout the structure. Growing as they do from the mucous lining of the pharyngeal vault they cannot fail to exercise an irritating effect upon the pharyngeal tonsil in their immediate vicinity; an influence which frequently leads to proliferating and hypertrophic changes in it, which not only add to the bulk of the obstructing mass, but furnish in the increased secretion, a moist environment very favourable to the luxuriant development of the vegetations.

From the foregoing reasons—plus the extremely wart-

like appearance of the smaller growths; their tendency to bleed when touched, a circumstance characterising papillary growths in the bladder and elsewhere, when mucous membrane forms the basis from which they grow; and lastly, their tendency to spontaneous disappearance after adult life, like warts on the hands, etc., I have been led to discard the usual appelative "adenoid," in favour of that adopted as the heading of this chapter.

Etiology. That the disease may be congenital is to be inferred from the fact that I found them in an infant of nine months; and have operated on another somewhat over two years of age, who had exhibited indications of their presence from birth. In every case of so-called "snuffles" they should be looked for, as the foregoing experience indicates that this symptom is occasionally due to the existence of the vegetations thus early in life. On the other hand, some of my patients have referred the initiation of the disease to an attack of one of the exanthemata; that is to say, the subject or his friends were unconscious of any nasal trouble till after an attack of measles or scarlet fever, on recovery from which the symptoms of nasal obstruction commenced.

The influence of a *damp atmosphere* in favouring the development of the disease, where the proclivity already exists, is no doubt an important factor in its causation. The presence or absence of such climatic environment should therefore be taken into consideration in estimating the value to be attached to the geographical distribution of the disease. In this connection it is of interest to note that these Islands, with Denmark, Holland and the adjacent

sea-board districts, have furnished the largest proportion of cases yet recorded.

Heredity is, no doubt, an important factor in predisposing to the disease. The "family proclivities" insisted upon by Loewenberg, from the fact that the disease frequently appears in several members of the same family, belong doubtless to this head. The circumstance here referred to is well attested, and was illustrated in the cases furnished by the family R——, a boy and his sister belonging to which presented themselves for deafness due to this disease, at my aural clinique. An elder married sister was also under treatment for polypus of the ear; attached to this was the necrosed manubrium which came away with the polypus. In this latter instance the post-nasal growths, supposing them to have been the origin of the ear mischief, which resulted in polypus, an assumption favoured by the early history of the patient—had disappeared at the time when she came under treatment. This case illustrates the probable result in severe middle-ear disease extending into later life, which is the ordinary outcome of neglecting these growths, even though they may in the meantime have disappeared spontaneously.

As regards enthetic heredity, a wider experience of the disease has led me to modify the opinion formerly expressed, to the effect that I had been unable to trace any relationship to it: I now incline to the view that it is one of the remoter sequences of the taint. This conclusion has been arrived at because in certain family histories I have been able to trace, the disease has appeared as the representative of the

diathesis in the quadroon or octoroon descendant from the original traducer of the family tree.

The *exact nature* of the inherited proclivity will, I think, be found in enfeebled inhibitory power exercised by the vaso-motor centres over the particular tissue tract involved, leading to hyper-nutritional states of this region; and which condition of tendency to local vaso-motor pareses, meaning hereby that deterioration of vaso-motor centres already described, is undoubtedly transmitted by parents to their off-spring.

As it is rare to meet with the pronounced phase of the disease after the period of adolescence, notwithstanding that traces of its past existence are frequently observed in middle life, the question arises—What becomes of it in those numerous instances where children so afflicted have grown into adults, with their ailment undetected, and therefore unrelieved? It is most probable that the growths, as already hinted, disappear in the same way as warts in other localities are known to do. The gradual enlargement of the region which is their favourite habitat, and which takes place as development approaches completion in common with the rest of the facial framework, favours this presumption. Increase of space in the naso-phayngeal region implies freer access of air, readier escape of secretions, and consequently greater dryness of the surroundings generally. The soil thus drained and ventilated appears unfitted for these vegetations to flourish upon, especially when accompanied with the increase of nerve and circulatory force following the completion of this change; accordingly they diminish gradually and finally disappear.

This disease therefore constitutes one of the few affections concerning which it may with truth be said that the patient "grows out of it." It would be most unwise, however, to wait for the advent of such spontaneous extinction, because of the evil consequences effected during its period of persistence, especially on the organs of hearing; consequences which constitute for it a special demand on the attention of aurists.

But apart from the foregoing, there are other results, having reference to the locality primarily affected, which point to the necessity for early treatment. Thus, the obstruction to nasal respiration induced by the growths, means that the air inspired by these patients is drier, colder and less free from impurities than it would be had it entered through the nasal channel designed for its passage, and so predisposes them to lung affections of an inflammatory type: also, from this cause, as well as from reflex irritation of the vagus nerve, to asthma, which in children is an occasional concomitant of the disease. Further, they maintain a low state of vitality in the regions implicated, which predisposes to frequent attacks of sore throat, and tends to establish enlargement of the tonsils. Should these patients become the subjects of the exanthemata, especially of diphtheria, their symptoms are more severe, and show a less tendency to yield to treatment, than where such complications do not exist. Thus the subjects of this disease are handicapped against recovery from illnesses, which are the common lot of the younger representatives of the race.

The *Symptoms* which indicate the presence of post-nasal growths are—marked *modification of the voice*, so that it as-

sumes a nasal twang, in which the letters *m* and *n* are pronounced as *b* and *d* respectively: *buccal respiration*, that is, the patient breathes through his mouth, keeping it always open to facilitate his so doing, and is unable to close it during sleep, by reason of which chronic pharyngitis is commonly established. *Snoring* is a direct consequence of this condition. It is due to the depression of the soft palate and its diminished pliability, owing to the presence of the tumours; its free margin is thus pushed into the midst of the breath-way, and vibrates, like the reed of a wind instrument, with each act of respiration.

All the symptoms referable to obstructed nasal respiration have attained much less marked degrees of intensity in the cases observed by myself than in those reported from the Continent. Where buccal respiration obtains to any great extent, the expression of the patient is markedly altered for the worse—the open mouth and pendulous lower lip imparting a vacant, almost stupid appearance, to the physiognomy. The degree of *flux* from the anterior or posterior nasal orifices is liable to vary: in most cases some catarrh exists, and when, as occasionally happens, the patient is unable to blow his nose, the discharges trickle from the excoriated nostrils, adding much to the discomfort as well as to the disfigurement of the patient.

I have not noticed *loss of taste or smell*, though it is conceivable that these senses would suffer where extreme occlusion of the nasal fossæ exists. Neither have I seen *deformity of the chest-walls* as presented in a proportion of Loewenberg's cases. *Night sweats* have occurred in a number of my patients, and are to be accounted for

probably by the complementary activity of the skin acting as a set-off to the impediment to respiration.

Interference with the *organs of hearing*, inducing more or less deafness, is the most frequent, and to my mind the most important, of the direct lesions resulting from the disease. Not more than five per cent. of my cases have escaped this complication. The severity of the ear mischief will depend largely upon the situation of the vegetations. Thus an extensive development of these in the vault of the pharynx interferes less with the function of the Eustachian tubes than does a much smaller amount seated upon the posterior wall. In this latter situation, a single growth will induce hypertrophic catarrh of the pharynx extending into the tubes, and especially the formation of redundant folds of tissue about their orifices, which as already stated are most detrimental to the tubal function.

As regards the nature of the *ear affections* induced by the foregoing conditions, they offer no special characteristic by which to distinguish them from the other affections of the organs of audition having a faucial origin—that is to say, if catarrh is the prominent symptom of the throat affection, the tendency is for this to involve the Eustachian tubes and tympanic cavities. Suppuration and perforation of the membrana tympani, with polypus, or polypoid granulation, —often concealing patches of exposed or carious bone—in short all the accompaniments of confirmed otorrhœa, are most frequently seen under these circumstances—*i. e*, when the vegetations affect mainly the vault. On the other hand, when a fewer number of growths with augmented mucous folds are seated on the posterior wall of the pharynx,

implying complete mechanical occlusion of the tubes, the form of ear disease ensuing hereon is more apt to assume the form of non-suppurative inflammation of the middle-ear, with collapse of the drum-membranes, and severe degrees of deafness. The latter is far more difficult and tedious to treat than the former, and the prospect of recovering a useful amount of hearing power is less after it, than when the grosser phase of suppuration has existed.

The *diagnosis* of post-nasal growths is by no means difficult, but must not be allowed to rest on the foregoing indications of obstruction, the exact nature of which must be defined by direct evidence. Rhinoscopy in young subjects, is usually negative in its results, and may be dispensed with for the more certain indications afforded by palpation, or examination by the finger.

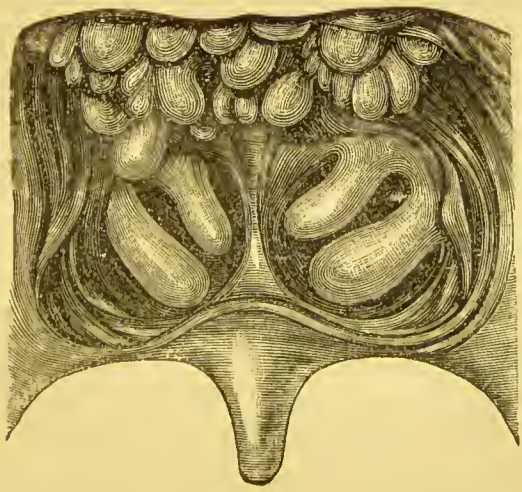
To make a *digital examination* of the post-nasal space, the left arm of the surgeon should be passed round the patient's head, so as to support it against himself, while his left hand rests on the patient's chin. By this means he can at the proper moment, restrain any attempt to close the teeth on his finger, an effort which patients of all ages seem unable to resist. The index finger of the right hand is then passed upwards behind the soft palate, care being taken not to carry the uvula with it. If the examiner possess the *tactus eruditus* of experience he will be able to pronounce definitely as to the existence of the disease. Instead of a clear space with its well defined landmarks, a soft irregular mass is encountered, the sensation imparted to the finger being compared by some authors to that of touching a "bunch of worms." It bleeds on contact with the

finger, and more or less occupies the region. At other times the digit encounters the obstruction immediately behind the velum, after passing which the vault on either side the septum is found perfectly free.

If performed skillfully this proceeding is not very painful, and occupies a few seconds only. In older persons the rhinoscope may be used, when the appearances more or less resemble the condition represented in the accompanying engravings.

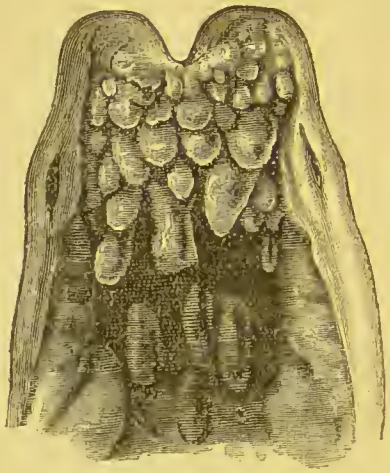
As regards *differential diagnosis*, the disease most likely to give rise to doubt is simple hypertrophy of the pharyngeal tonsil. Its characteristic features are discussed and figured in the preceding chapter. By comparing these with the details of the disease now under discussion, as just depicted, the surgeon should have no difficulty in determining the

FIG. 13.



Rhinoscopic view of vault of pharynx, showing small multiple growths.

FIG. 14.



Posterior wall of pharynx similarly affected. The group of non-pendulous projections occupying the lower third of the wall, represent patches of hypertrophied mucous glands.

nature of the case before him. Cystic degeneration of the mucous membrane of a large portion of the naso-pharynx is occasionally met with in comparatively young children, and might without the exercise of great care, lead to an error of diagnosis. This form of polypoid disease is considered in the succeeding chapter, so that it is unnecessary to devote further time to it here.

TREATMENT OF LYMPHOID PAPILLOMATA OF THE NASO-PHARYNX.

IT is to be premised that constitutional measures are absolutely useless in effecting a diminution of the excrescences. Whatever depreciation the system may have undergone

in consequence of the disease, cannot be remedied till the mechanical obstruction to respiration due to it, has been removed.

Several cases treated in my clinic have been so far relieved by the use of alkaline nasal washes that they have declined further interference. These were of course of quite the mildest degree. Two or three others have recovered by the application of caustics, London paste, nitrate of silver in the solid form, followed subsequently by solution of chloride of zinc. The time required to produce anything like a decided impression upon the growths, and, in young children, the difficulty of doing even this efficiently unless they be anæsthetised, is so great that I have long abandoned any such attempt, and now only resort to operative measures for the complete extirpation of the disease.

One of the first cases on which I operated was that of a boy aged two and a half years, in whom the growths were located chiefly on the posterior wall of the pharynx, and were visible on raising the velum. At this time I was only acquainted with Mayer's cutting ring, and this being unsuited to the case, I used a pair of long dressing forceps, the curve of the blades being adapted to the proportions of the child, with which to crush the growths. This was done under an anæsthetic, and with a satisfactory result, but such a proceeding is quite inadequate to deal with the severer types of the disease.

As is usually the case each operator has his favorite instrument. Meyer of Copenhagen uses a cutting ring attached to a long stem. This is passed through the

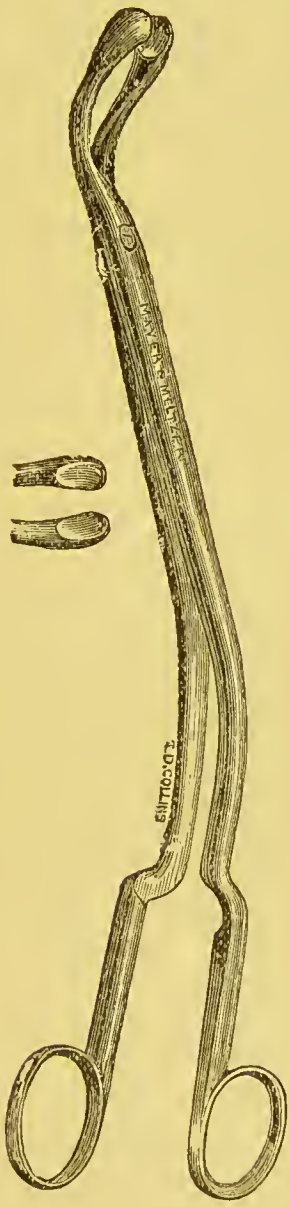
nostril into the space behind, the excrescence being pressed against its cutting edge with the index finger introduced behind the velum, and so severing the attachments of the tumours, a method which has not been generally adopted by other operators.

Delstanche of Brussels has invented an ingenious instrument which he calls a "sliding adenatome," with which to crush or cut off the growths. Other operators prefer the galvano-caustic-loop, or the cold wire-snare.

Since becoming acquainted with Loewenberg's forceps figured below, I have practically rejected every other in their favour, that is to say, in favour of his instrument modified to meet my requirements by the addition of a cutting edge to the posterior aspect of the blades. By means of this addition one is enabled to seize readily such of the vegetations as grow on the posterior and lateral walls of the pharynx, which with the original instrument cutting only at the points, was a difficult or impossible procedure.

In using this pharyngotome, the index finger of the left hand should be introduced into the space through the mouth, which must be kept open with a gag, to direct the blades of the instrument to the exact spot where they are to be closed upon the mass. In this way also the operator can detect, and so secure the removal of all remaining exuberant tissue. After the cavity has been thus cleared, it is still necessary to make a careful examination of the choanal orifices to ascertain whether the villous fringe exists to which allusion has been already made: this should be scraped off with the finger-nail, no other instrument being

FIG. 15.



Loewenberg's forceps or pharyngotome, showing the author's prolongation of the cutting edges on its posterior aspect.

so capable of adapting itself to the situation as this is. If attention to this point be neglected, an apparently successful operation which has yielded a large aggregate mass of tissue, will prove abortive as regards results, because this fringe of itself constitutes a complete obstacle to nasal respiration.

As a rule I find it expedient to have the patient anæsthetised, especially in the case of young children. One operation will then suffice for the entire removal of the disease, and operating during anæsthesia has the further advantage, from the thoroughness with which it can be effected, of rendering any after treatment by caustics, etc., unnecessary.

There is always a good deal of *hæmorrhage* during the operation, and the surgeon should be supplied with sponge holders to keep the larynx clear of blood. In two cases only, have I experienced any trouble from this cause, and in one of these it became necessary to plug the post-nasal space before the bleeding could be checked.

I do not believe in the *recurrence* of the growths after a thorough operation. When this appears to happen, it is due to some of the smaller ones having escaped removal; these developing later on, are then looked upon as a return of the disease.

Very frequently it happens that, with the removal of the cause, the deafness gets well of itself. But where the auditory apparatus has suffered in consequence of long existing catarrh of the middle ear, or obstruction of the tubes, or from both causes combined, the ear lesion will require treatment on the ordinary otological lines.

CHAPTER XI.

STENOSIS OF NASAL FOSSÆ; ITS VARIETIES; A FACTOR IN THE PRODUCTION OF POST-NASAL CATARRH, AND EAR DISEASE.

The deleterious consequences of naso-pharyngeal obstruction, both as it affects respiration and the special sense of hearing having been pointed out, so far as their origin in the post-nasal space is concerned, it remains finally to examine the sources of similar obstruction contributed respectively by the various anatomical structures which enter into the formation of the nasal apparatus. Here we shall be confronted with a larger range of disturbances, because the senses of taste and smell are more generally implicated in the latter than in the former category of instances. Though it is usual for several parts of the region of the naso-pharynx to contribute simultaneously to the general state of stenosis when catarrh is the starting point of the disease, yet is it possible to isolate and assign to each the symptoms which its particular abnormality occasions.

It will be seen in the sequel that the sources of nasal obstruction are very numerous, and their occurrence exceedingly frequent; yet are they generally ignored by the otologist for whom they should possess a paramount degree of interest. One reason of this oversight resides in the fact that it is often quite easy to pass the Eustachian catheter through the nasal fossæ without encountering any noticeable obstacle, even though an actual block to the

air-current exists. This occurs in the numerous instances of hypertrophic neoplasms arising from the lower spongy bones, because the soft compressible tissue of which these growths consist, yields readily to the pressure of the catheter, though it resists the passage of air in ordinary respiration; or rather—for this is the commoner event—diverts it from the lowest nasal channel, and so obliges it to pass along the superior fossæ of the nose.

This of itself is a serious departure from the normal physiological arrangement, for, as insisted upon by Fränkel, it is along this lower passage that air chiefly passes in ordinary nasal respiration. In the upper ones the air, though set in motion by the lower current, is comparatively tranquil, except in forced efforts, such as sniffing or smelling. One immediate consequence of this diversion of the breathing through the nose, is that it does not then pass over the tubal orifices, and thus the constant automatic capillary attraction of the tubal orifices upon the air current is prevented, as in neither inspiration nor expiration does it, under the altered state of things, come in contact with these.

Another source of fallacy in diagnosing nasal stenosis is inherent in the usual test; that viz., of causing the patient to utter the consonants *m* and *n* with a mirror placed under the nostrils; for this will be dimmed by the moisture of the air expelled through the upper channel only, though not so extensively perhaps as when no obstruction is present. Obviously, therefore, the "interrogation of the nose" can only be considered accomplished after a careful visual inspection of its recesses.

The morbid conditions I have met with in the nose, which interfere with audition, acknowledging for the most part a catarrhal origin, are the following:—

Diseases originating in connection with the TURBINATED BONES .
- Acute congestion.
- Chronic congestion with thickening.
- Hypertrophic neoplasms of muco-periosteum (lymphoid vegetations ?).
- Erectile tissue tumours (posterior ends of inferior spongy bones).
- Necrosis.
- Exostosis.
- Polypus.

Diseases originating in connection with the NASAL SEPTUM .
- Simple deviation.
- Exostosis.
- Enchondrosis.
- Cysts.
- Hypertrophy of muco-periosteum, passing into
- Fibroid tumours.
- Dislocation of septum from spine of superior maxilla.

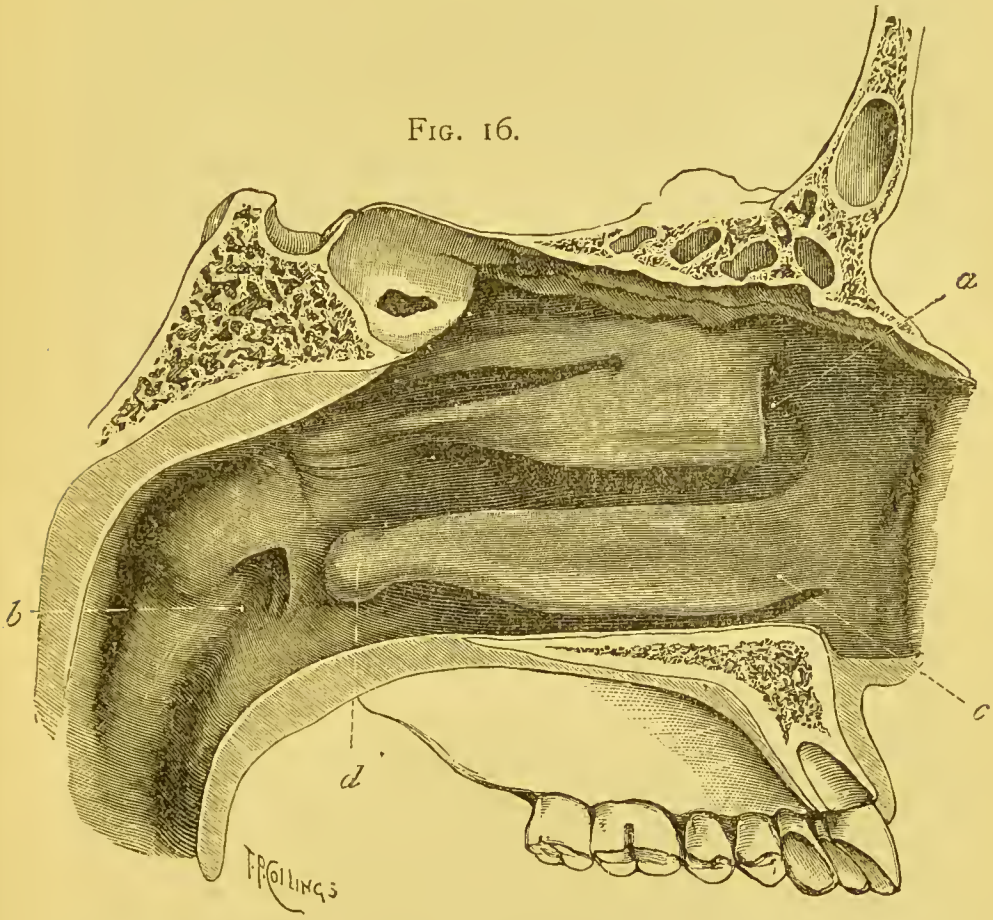
DISEASES ORIGINATING IN CONNECTION WITH THE TURBINATED BONES.

Acute congestion of the muco-periosteal covering of the inferior turbinated bones is present to a greater or less extent in most catarrhal attacks, and in its subacute phase may prove very persistent. It may be met with on both sides, or in

one only. When the external meatus is opened with a speculum, a bright-red round projection is seen to occupy the lower half of the nasal passage; when, as often happens, it meets the septum in the middle line, the injected and spongy surface of the latter appears to blend with it so completely that an uninitiated observer would find it difficult to say from which wall of the fossa the obstructing mass originates. If a probe be insinuated between the septum and the latter it will pass readily backwards, while the swelling can be compressed against the turbinated bone, showing at the same time its origin from this bone, as well as its soft spongy structure. This easily seen cherry-like swelling belongs to the anterior aspect of the spongy bone only, (*c.* fig. 16), but the affection is not limited to this situation as it may be traced backwards along the greater portion of the bone, and by the aid of the rhinoscopic mirror may frequently be seen to include its posterior end also.

When once fairly established—the result usually of allowing a cold to cure itself—there is but little tendency on the part of the swelling to subside spontaneously. On the contrary it shortly enters upon the *chronic stage*, in which organisable material is deposited in the interstices of the mass, resulting in a permanent hypertrophy or thickening of the tissues about the lower spongy bone. It is now paler in colour, and somewhat less in bulk than in the acute stage, but retains its compressible character throughout. This condition is frequently associated with exostosis of the bone from which it arises, or with a simple inflammatory thickening of the spongy bone.

FIG. 16.



Vertical section of nose, septum removed.

a. Anterior or presenting aspect of middle turbinated bone. *b*. Orifice of Eustachian tube, left. *c*. Anterior aspect of lower spongy bone. *d*. Posterior end of lower spongy bone, showing erectile tissue.

Such a swelling situated in mid-breath channel, not only obstructs or diverts the breathing, but also prevents the escape of mucus which collects behind it, and gives rise to violent blowing of the nose for its expulsion, which is,

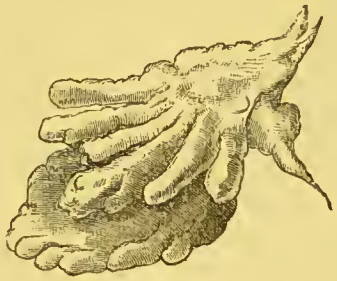
however, seldom completely efficacious to relieve the sense of stuffiness in the nose. Some degree of *deafness* and *tinnitus* usually accompany this condition. The former symptom is readily explained by the catarrhal accompaniments of the post-nasal space implicating the tube and middle ear.

That *tinnitus* has its occasional origin in this form of nasal stenosis will be apparent from the following observation. When the swelling of the inferior turbinated bone approximates very closely to the septum, but does not quite touch it, and the interval between the two congested surfaces is occupied by transparent mucus, light being reflected upon it from the mirror, the surface of this fluid will show a bright spot very like the cone of light upon the tympanic membrane. This is seen to move synchronously with the circulation, in fact a pulsating reflex is produced exactly like that seen in a perforated drumhead, when the gap is occupied with fluid. This pulsating reflex is the index of the excursions of the congested arterioles. A current of air passing over this spot would be thrown into vibrations, similarly to that seen when fluid occupies the space, and this vibrating stream entering the middle ear through the Eustachian tube, will be translated into sound when it reaches the auditory nerve.

Hypertrophic neoplasms of the soft investing tissues of the inferior and middle spongy bones.—Very frequently the hypertrophic processes taking place in this locality assume the phase of proliferation, and produce an abundance of new tissue of quite unexpected proportions. A similar state of things is not rarely met with on the pre-

senting surface of the middle spongy bone, but to a much less extent than on the lower one. It may easily be mistaken for polypus, but has a more fleshy consistence, reddened colour, and a very irregular outline, which quite distinguish it from true polypus. The accompanying figure represents such a neoplasm removed entire with the por-

FIG. 17.



Proliferating neoplasm, or
Lymphoid vegetation of lower spongy bone.

tion of the spongy bone to which it was attached. On comparing this drawing with that of some of the larger post nasal growths, fig. 11 for example, one will be struck with the similarity existing between them. There is the same tendency to form digit-like processes in both, only these in the case of the growth from the spongy bone are longer, and in proportion finer. Owing to the narrowness of the nasal fossa compared with that of the post nasal space, and the greater compression to which, in the former, these excrescences are subjected, the processes referred to are not at first very evident, being squeezed against the bulk of the tumour, but after remaining a few hours in

weak spirit and water, these are readily unravelled, and present the aspect shown in the above figure. When sections of these growths are prepared as microscopic specimens, they present very similar appearances to those seen in corresponding preparations of post nasal growths, though possessing a larger proportion of connective tissue bands derived from the periosteal elements of the investing mucous tissue. Should subsequent observations confirm this structural identity I would suggest for them the term "Lymphoid Excrescences" of the spongy bones. They are of very common occurrence in the hospital out-patient room, and the identification of these with the better known post nasal disease, will mark a point in our knowledge of catarrhal products in the nasal region.

Corresponding neoplasms to those just discussed, frequently grow upon the anterior presenting surfaces (*a.* fig. 16) of the *middle spongy bones.* It is not unusual for such patients to complain of severe *aching pain across the bridge of the nose,* which is then apt to be referred to neuralgia, and to be treated from this standpoint by physicians unaccustomed to "interrogate the nose." In nearly all cases in which I have been called upon to treat this symptom, I have seen this neoplasm considerably developed and pressing against the septum in the region to which the pain is referred. When it occurs bilaterally, as it often does, it is conceivable that the pain may be due to the squeezing of the septum between the new tissue on each side of it—a view that receives confirmation from the fact that the symptom has disappeared with the removal of its presumed cause. So far as my experience extends, neoplasms in this situation

(except mucous polypi) seldom attain the large dimensions of those growing from the inferior turbinated bones; but they contribute a share towards the general stenosis which should not be overlooked, and while producing the symptom above referred to, they tend also to depreciate the *sense of smell* by preventing access of air to the olfactory region of the nose.

Erectile-tissue tumours occupying the posterior ends of the inferior spongy bones, (*d.* fig. 16) occur with greater frequency than is generally supposed. An acute turgescence of this erectile tissue during a common cold will explain much of the impediment to breathing, and also the deafness, to which some subjects are peculiarly prone during an attack of catarrh. It is not, however, to this comparatively transient swelling that the present remarks have reference, but rather to the fact that a chronic hypertrophy of this tissue is engendered by such frequently recurring congestions. In this chronic stage the trabecular tissue undergoes development, the interspaces are permanently enlarged and distended with serous fluid or organised material, and project as nodules between the intercellular fibrous tissue bands.

The entire mass as seen in the rhinoscopic mirror presents certain variations. Occasionally it is intensely red, resembling a partially ripe mulberry—but this is an exceptional appearance. It is usually of a quite pale colour, rounded in form but nodulated like a mulberry calculus. It projects backwards into the post nasal space, and frequently extends so far in this direction as to occlude the orifice of the Eustachian tube. When both sides are

affected the tumours meeting in the middle line behind the septum obscure the latter, so that only a small portion of the vomer can be seen towards the vault of the pharynx.

In yet another phase the tumour presents an œdematous appearance more nearly approaching that of a mucous polyp, but still retaining its rounded form and quasi-nodular surface. In this state it is easy to disperse the mass by pressure with the finger introduced behind the velum. I have only met with this aspect of the disease on two occasions. In one of these I had removed the firmer-looking tumour, that on the left side (fig. 18, *b*), by means of a snare, and was endeavouring to repeat the process on

FIG. 18.

Erectile tissue tumours referred to in text.
a. Right tumour, soft and œdematous.
b. Left tumour, firm and nodulated.

FIG. 19.

Left tumour (*b*, fig. 18) after removal.

the right side, but finding it impossible to prevent the wire loop from slipping over the yielding mass, attempted to retain it with the aid of a finger introduced behind the velum. In this manipulation the mass collapsed and disappeared; neither did it return. In the other instance I was able to verify the foregoing experience, as it happened in a case of

cleft palate, where the region was particularly easy of observation, and favourable for manipulation.

This allusion to *cleft-palate* affords the opportunity of recording my experience that it is rare to find the inferior spongy bones normal in this deformity. The erectile tissue, corresponding to the posterior half of the bone, being usually permanently augmented into a huge spongy mass of a pale purple colour, on one or both sides; a condition which appears to be due to direct contact with the atmosphere owing to its exposed position just above the cleft. It may be that contact with food contributes to this effect, for it is noteworthy that on the side of the cleft to which the vomer is united (when this happens) and so covers in and protects one spongy bone, the latter retains its normal condition, while that belonging to the opposite and denuded nostril exhibits the disease.

The following symptom is occasionally met with as the consequence of a *morbid susceptibility of the erectile tissue* now under consideration. After the patient has retired to rest the nostril of the side on which he is lying becomes blocked, and by interfering with respiration causes him to wake up and turn round. Shortly, the other nostril which is now lowest in position experiences a like obstruction, so that the sleep of the subject is constantly disturbed. The condition in question is due to defective vaso-motor inhibition of the circulation of the part, owing to which the blood is allowed to gravitate into the most dependant portion, the cavernous structure of which becomes in this manner sufficiently swollen to occlude the choana, first of one side and then of the other. On assuming the upright posture

the inconvenience disappears, but it is none the less a very great annoyance, and from interference with necessary sleep may come to assume important bearings.

Too much smoking and drinking favour its occurrence, but independently of these it may remain as the sequela of repeated catarrhs; or it may be the outcome of a general illness during which the the vital energy of the nutritional centres has been impaired: or as the result of worry, wear and tear, mental strain, &c.

Necrosis of the inferior spongy bones occurs, though rarely. In one case this was symmetrical, both bones being similarly affected. The investing tissue was pale and loosely adherent; on the right side the bone and its covering peeled off from its attachment to the superior maxilla with the slightest effort, and without the relic of a denuded surface on the outer wall of the nostril. It must therefore have been in this state for a considerable period, and wanted only the manipulation referred to, to detach it; on examining after removal, the turbinated bone reduced to a thin squame, was lying loose in its muco-periosteal investment. I am not aware that this form of necrosis has any particular bearing on ear disease, so it will suffice here to call attention to the fact of its occurrence, and the probability therefore of its happening to other observers.

Another form of disease of the inferior turbinated bones is illustrated in a boy at present under treatment in the Aural Department of the London Hospital. He came for deafness, the only morbid condition apparent in the ears being considerable depression of both *membrana tympani*.

There was, however, complete stenosis of both nasal fossæ, each nostril being occupied by a mass of proliferating tissue, showing a tendency to polypoid degeneration. When this was penetrated by a sharp-pointed instrument the bulk of the obstruction was found to consist of the greatly enlarged spongy bones in a more or less necrosed condition. After operating for the removal of the obstructing masses, the hearing improved to nearly normal, without further treatment of the ear affection, than was comprised in the occasional use of Politzer's air bag. This patient showed well-marked indications of syphilitic heredity.

Portions of necrosed and exposed bone are met with in the *superior nasal region*, and may be contributed by the ethmoid, lachrymal, superior maxilla, as well as by the bones which enter into the formation of the nasal bridge. In these situations, the diseased bone is frequently disguised by the presence of mucous polypi. I have met with this as the result of injury, and it is doubtful whether it ever occurs idiopathically except in the presence of some constitutional taint. It is nearly always associated with true ozœna, and constitutes the worst phase of post nasal catarrh, but does not necessarily implicate the ear.

Exostosis of the inferior turbinated bones occurs much more frequently than the preceding, and assumes considerable importance in the present relationship. I have generally met with it about the middle of the free margin of the bone, when it projects against the septum and fills up more or less completely the lower channel of the nose; but it is by no means rare for the entire bone or a large

portion of it, to be thus hypertrophied. We become aware of its existence on attempting to introduce the catheter, which is rendered impracticable in consequence of the firm resistance of the bony outgrowth. It is necessary to guard against the inference that every firm obstacle to the introduction of the catheter, or a probe, in this situation, indicates an exostosis, for in fact the spongy bones develop many irregularities of shape and position, which fall under the head of malformations rather than of pathological processes. Still, there is a numerous balance of cases in which marked exostoses exist; they are usually associated with the anterior hyperplasias of the investing membrane first noticed, and are probably inflammatory and catarrhal in their inception. They rise in importance in proportion as they are accompanied with corresponding projections from the bony septum, under which circumstance there may be present a complete barrier of bone, through which no air can pass in either normal or forced respiration.

Nasal Polypus.—While the lining membrane of the inferior turbinated bones tends more frequently to develop neoplasms of a simple hypertrophic character, that of the middle turbinated bone more frequently proliferates in the direction of mucous polypus. Considering the frequency with which these tumours are met with in the nose, and the relatively large bulk to which they attain, it may at first sight seem surprising that they so seldom implicate the auditory apparatus. In my experience it is comparatively rare for the subjects of nasal polypi to complain of deafness—an exemption which appears to me to arise from the fact that they seldom intrude into the inferior channel of the

nose, which is the true auditory passage. The situation from which they most frequently arise, the elasticity of their texture, and the rapidity with which they grow, up to a certain point, alike dispose them to pass into the widest space, and to keep them out of that below the inferior spongy bone. Of course there are many exceptions, in which deafness indirectly depends upon the presence of polypus, because in whatever form it exists it is an excitant of catarrh, and from this point of view alone should be got rid of as soon as detected.

I have met with two cases of the disease in comparatively early life which possessed features of peculiarity and interest. In both, besides the readily perceived antero-nasal polypi, there was almost uniform cystoid degeneration of the mucous lining of the nose extending far backwards into the post nasal space. Both these patients were between thirteen and fifteen years of age, and in the elder boy the disease dated from birth, and was associated with advanced pathological changes in the ears. The bridge of the nose was much flattened, from spreading of the nasal bones, in consequence of the pressure from within during their plastic state in very early life. Examination revealed numerous superficial necroses of the nasal walls, including that furnished by the superior maxilla, and also of the middle turbinated bone; the lower spongy bone had already disappeared, its situation being occupied by a mass of diseased tissue. These cases appear to possess a certain diagnostic value; the extensive exfoliations of bone which appeared to result from the cystoid degeneration of its investing membrane, rendered the case of the elder

one more especially unique in my experience of non-syphilitic disease of this region in young subjects.

The order in which the phenomena just recorded are stated to have succeeded each other, *i.e.* first, polypoid degeneration, second, exposure and desquammation of bone, is one about the correctness of which I am not perfectly satisfied. It is true that it is common to find such superficial necroses in connection with mucous polypi proceeding from the middle turbinated bone, involving also other osseous portions of the external wall of the nose—but whether the disease commences in the latter or begins in the muco-periosteal covering,—is a point concerning which the evidence before me appears inconclusive. In favour of the assumption first made, is the fact that the investing membrane is exposed to all the incidences of catarrh, and is presumably more prone to initiate morbid processes, which may extend to the deeper structures, than that the disease should begin in the bone; but as already stated this probability alone is an insufficient basis upon which to found a positive view of the etiology of the occurrence.

Diseases originating in connection with the Nasal Septum.

The following diseases of the septum nasi are those which most frequently interfere with audition; they partake of the character of the structures which enter into the formation of the nasal partition, consisting of bone pos-

teriorly and of cartilage anteriorly, with their respective coverings of muco-periosteum and muco-perichondrium.

Deviation of the septum occurs so frequently that it cannot *per se* be regarded as a pathological incident. It acquires this attitude however, in virtue of its relationship to morbid states of adjacent structures, as for instance when a comparatively slight degree of deflection from the median line brings it into contact with an enlarged turbinated bone, whereby an obstruction is caused, which neither of the contributory factors of itself would have sufficed to accomplish. The curvature may involve the vomer as well as the cartilage, or it may be confined to one of these only. Sometimes there are several projections of limited extent alternating with depressions or valleys, the prominence towards one side being represented by a subsidence on the other. Thus it may happen that one nostril presents cavern-like proportions at the expense of the other. The narrower channel readily becomes blocked on the accession of a slight cold and the turgid state of mucous membrane accompanying it. From this cause also, a crooked septum is a source of annoyance to its possessor. The deflection is more commonly met with towards the left side.

The deflected portion of the septum is prone to undergo an augmentation in the bulk of the tissue of which it is constituted, in which case we have to deal with an exostosis or an enchondrosis in addition to the flexure. Both these conditions may arise independently of the latter, and will be treated of immediately, but it is important to bear in mind the probability of such a hypertrophy compli-

cating the deviation, when operative measures are contemplated.

Exostosis of the septum is in my experience much more rarely met with than is the corresponding condition in the inferior turbinated bone already described. I have occasionally met with it just beyond the vestibule, at the anterior aspect of the meatus, at which point it proceeds from the crest of the superior maxilla which receives the cartilage; in this situation, such an upheaval produced in one patient a dislocation of the cartilage of the septum, whilst itself spreading towards the floor of the nostril—the two conditions constituting a very complete obstruction to respiration.

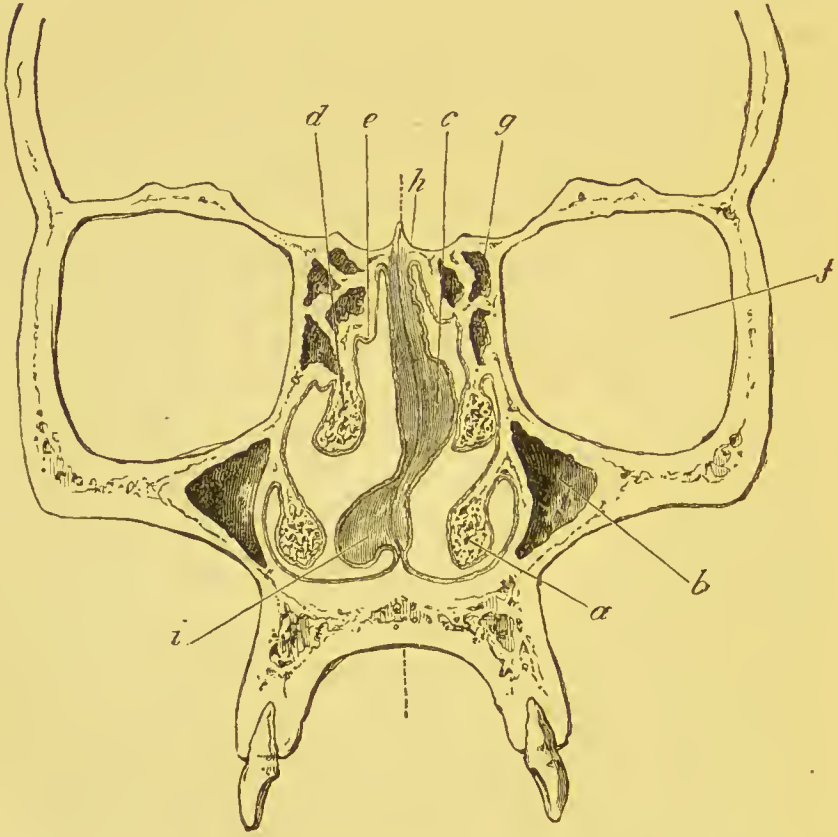
The extreme phases of exostosis are met with, however, in connection with the vomer, and usually at its posterior aspect, where they appear to originate near the floor of the nares, and gradually increase upwards and outwards, constituting a formidable barrier to respiration. These cases are fortunately not very frequent, and in the three or four extreme instances of the kind I have treated, there has always been deviation of the vomer, the exostosis occurring on the side of the bulge. How these two conditions are related as regards cause and effect, I am unable to say, though it seems probable that the progressive outgrowth of bone tends to drag the thin partition over to the side on which it is slowly deposited. In a marked case of this kind recently under my care, the exostosis together with the flexure extended outwards to such an extent as to compress the turbinated bones against the outer wall of the nose, and so completely closed the posterior outlet of the

left nostril that I was unable to detect any orifice that would allow the passage of a fine probe. The patient was a gentleman from the West Indies, and stated that it was only within the preceding eighteen months that he had been unable to pass air through that nostril, during which time he had been much inconvenienced by the inability to clear the passage of secretion. It would seem, therefore, that the disease is capable of comparatively rapid evolution.

Enchondrosis, or *Enchondroma* is distinctly the most common affection of the septum which will confront the surgeon from an aural point of view, and as far as I know it has not been hitherto treated of in this connection. Enchondroses occur at any part of the cartilaginous septum, and are met with at all periods of life, and in both sexes, but more frequently in males. "They are simply local outgrowths from pre-existing cartilage, and in structure and physical characters closely resemble normal cartilage. Fatty degeneration and mucoid softening are common changes, and may lead to the formation of large softened masses which present the appearance of cysts. In rare cases the skin covering the tumour ulcerates, and a fungating mass protrudes." (*Pathology and Morbid Anatomy*. Dr. T. H. Green). I have quoted this description of the disease because it exactly applies to enchondrosis of the nose, though not made by the author with reference to this region. The tendency to cystic degeneration is quite frequent, but I have only once met with the disease in the advanced stage in which ulceration of the investing membrane had taken place and left a slightly protruding, granular looking surface on the opposite side of the septum to that in

which the bulk of the tumour was seated. Here again it was the left nostril which exhibited the latter state, while the

FIG. 20.



Transverse section through nose seen from behind: from a wet preparation, viewed from behind.

a. Inferior turbinated bone. *b*. Cavity of antrum. *c*. Septum, distorted, and exhibiting hypertrophic outgrowths. *d*. Middle turbinated bone. *e*. Superior turbinated bone. *f*. Orbit. *g*. Ethmoidal cells. *h*. Interior of cranium. *i*. Large enchondrosis projecting into lower nasal fossa, and approaching right inferior spongy bone and floor of nasal cavity. A similar projection *c*. on the opposite side of the septum lies in contact with left middle spongy bone. This figure is typical, representing enchondrosis of the septum as commonly met with.

proliferating surface was seen in the right. *Cystic tumours* originating in this way collapse when properly treated, and a formidable looking obstruction is thus readily disposed of.

The favourite location for enchondrosis is just within the meatus, at which point it projects into the nasal fossa, leaving a small space between the under surface of the excrescence and the floor of the nose, along which it is possible to insinuate an ordinary probe. In this position it may reach the inferior turbinated bone, and if the nostril is narrow may even touch the ala. While writing these pages I have treated a gentleman the subject of this condition, who had acquired the habit of lifting the ala away from the tumour whenever he felt the necessity for greater freedom of breathing than he was capable of effecting otherwise.

The *muco-periosteum of the posterior aspect of the vomer* is frequently hypertrophied to a considerable extent, when it presents in the rhinoscopic mirror the appearance of an irregular grey mass heaped up on one or both sides of the partition (see fig. 21), and contributes its share of obstruction to the nasal channels. It is prolonged forwards for

FIG. 21.

Hypertrophy of muco-periosteum of posterior aspect of vomer.

a variable extent as a thickening of the vomer, in the nasal fossæ. Although frequently observed I have never met with it independently of some one or other of the hyperplasias already described.

From the following details it would appear that the tendency of hypertrophies in this situation is progressive, as several cases have come under observation in which the bilateral mass has coalesced towards the post nasal space, developing into a fibroid tumour, and attaining large proportions. In one instance presented by a girl of sixteen years having well marked indications of hereditary syphilis, the the tumour appeared in the rhinoscopic mirror to proceed from the vault of the pharynx, descending over the choanæ, which it completely obscured. On examining by palpation this impression had to be modified, because it was possible to isolate the margins of the growth with the finger, its sole attachment being then found to be to the vomer, to which its anterior surface was firmly adherent, as well as to the floor of both nasal fossæ for a short distance on each side of the septum. Here the tumour had

FIG. 22.

Fibroid tumour growing from posterior aspect of vomer, and occluding choanæ. The dotted lines show the situation of septum and turbinated bones.

grown backwards into the naso-pharynx, where room was afforded for its expansion, and extending in all directions had formed a shield-shaped mass exactly covering the anterior wall of the space, and of course preventing nasal respiration.

This patient was totally deaf. It is possible that some cases of tumours in this locality supposed to grow from the base of the skull, etc., would on more complete examination be found to have an origin similar to that now described.

Dislocation of the septum from the anterior maxillary spine occasionally happens, and gives rise to an unsightly deformity, from the circumstance of the disengaged ridge of cartilage projecting from one or other meatus. But besides this it forms a positive obstruction both to respiration and the discharge of secretions. Allusion has already been made to one cause of this lesion, viz., the pressure of an exostosis. A strongly marked flexure of the septum has the same tendency to displace the anterior attachment of the cartilage. Blows on the nose, and violent manipulations of the organ in the efforts to free it of mucus, (Goodwillie) operate in a similar direction. The treatment is by no means difficult, and in more than one instance I have observed its spontaneous retraction on removal of the displacing outgrowth, rendering any special interference on its behalf unnecessary.

CHAPTER XII.

TREATMENT OF NASAL STENOSIS.

In considering the treatment of the varieties of nasal obstruction, having in the main a catarrhal origin, I shall observe the order in which they came under discussion in the preceding chapter, beginning with those originating in the turbinated bones.

Stenosis arising from the Turbinated Bones.

Acute congestion of the investing membrane of the inferior turbinated bones is most speedily relieved by scarification or puncture. A fine bistoury, or broad needle mounted in a handle, suffices for this purpose. The nostril being dilated with an operating speculum, the presenting red tumour, illuminated by the forehead mirror, is freely punctured, the point of the instrument being kept parallel with the line of the spongy bone to avoid impinging upon it. Free bleeding follows, which subsides of itself in a few minutes. The pain is slight, and the relief to all the symptoms very marked. If the hæmorrhage threatens to exceed the requirements of the case, it is readily checked by packing the nostril between the puncture and the septum with tannin wool.

In the more advanced stage of chronic congestion associated with *hypertrophy of the tissues*, simple puncture is

insufficient to reduce the mass, which now has become a source of permanent obstruction to the nasal functions. It is necessary to remove a portion of the swelling. This may be done by transfixing the mass with a long pin, passing the wire snare round this, and tightening it behind the pin. The cold wire snare may be used for this purpose, or the galvano-cautery loop may be employed, with equal efficiency: or, it may suffice to attack it with a fine electrode, allowing this to bury itself in the tumour, which afterwards shrivels up, and disappears. In operating with the cautery it is of first importance to protect the septum and floor from contact with the heated instrument, because in this case, the septum being wounded, the opposed granulating surfaces will unite, and so a bridge of new tissue be formed across the meatus, which leaves the patient exactly where he was before the operation.

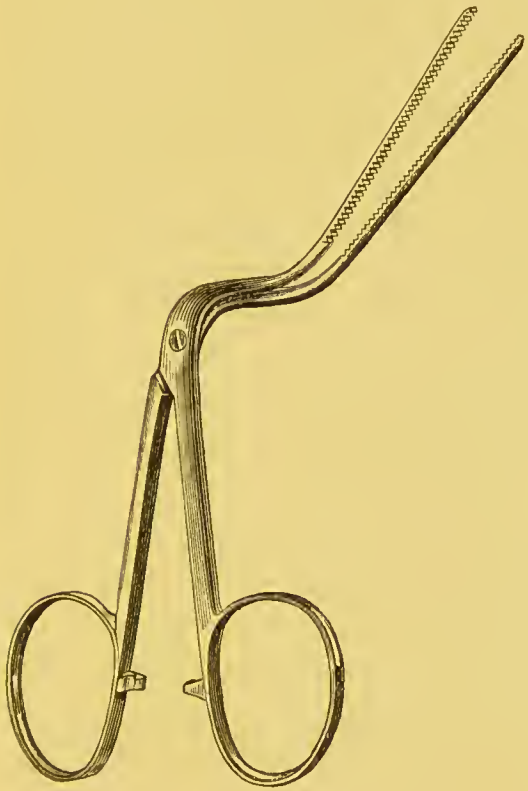
In this procedure reliance is placed in the contraction of the cicatrix, which providing some tissue be removed or destroyed, will effect a complete obliteration of the mass. Should the spongy bone have participated in the thickening the preceding measures will not suffice for its reduction. The treatment now required will be described in the succeeding section.

Lymphoid vegetations, or hypertrophic proliferations from the inferior turbinated bone require very complete extirpation to secure their non-recurrence. This tendency arises not because the growth itself is a recurrent one, but because of the difficulty of securing its entire removal when a large surface of the bone-covering is involved in the disease. For lymphoid excrescences in this locality exhibit the same

tendency to reappear, as they do in the post-nasal space, after an insufficient attempt to extirpate them. Should it be limited to the anterior aspect of the bone, as is often the case in young children, any of the measures described above will answer the purpose of treatment. Indeed in these little patients simply crushing the mass with a pair of dressing forceps will destroy its vitality, after which it is thrown off, and a cure accomplished. But in adults who occasionally present very pronounced developments of the disease, I have found it necessary to remove a strip of the bone along with the growth, which decision has been slowly arrived at, after many less radical methods had been adopted with an unsatisfactory result.

The operation which I now practise in extreme cases of this disease is applicable also for the removal of exostosis of the inferior turbinated bone, or for every other condition which may render the reduction in the bulk of this spongy bone a necessity. It requires that the operator be provided with the following instruments. A pair of forceps with thin but strong blades, so shaped that every other part is out of the way of the surgeon, and does not interfere with his vision. These are fitted with a catch near the bows. The free edge of the spongy bone is grasped by the blades of the forceps at the line where it is intended to divide the bone, and the catch being closed, it now serves as a guide for the *nasal plough*, with which the severance of the bone is effected. The latter is a kind of gouge, a portion of the cutting surface of which is curved upon itself, while the rests projects forwards keel-wise, and ends in a blunt point.

FIG. 23.



Author's forceps for guiding *nasal plough* in removing portions of inferior turbinated bones. The above is for use in the right nostril, and when introduced the bows stand over towards the left.

FIG. 24.

Author's nasal plough : right.

The blunt point of the plough is now passed beneath the turbinated bone and outside the forceps, (as regards the middle line of the body) to which it readily adapts itself.

It is now pushed freely along the nostril keeping it close to the forceps until the post-nasal space is entered. It is then withdrawn followed by the forceps, when the latter will retain the growth, with a narrow strip of the spongy bone attached.

By the foregoing method it is possible to regulate very exactly the width of the slice which is to be removed from the spongy bone, besides which the difficulty of the operation is reduced to a minimum. I have never experienced any subsequent ill effects from this operation, for what ever object it has been conducted. In fact the tolerance of this bone for surgical manipulations contrasts in a marked degree with that of any other of the intrinsic structures of the nose.

As the muco-periosteal investment of the anterior half of this spongy bone passes insensibly into the erectile tissue of the posterior half, it is an invariable experience to find a considerable thickening of the latter associated with the lymphoid tumour of the anterior portion. Therefore if the operation can be made to include the whole length of the bone, so much the more relief will be afforded by it.

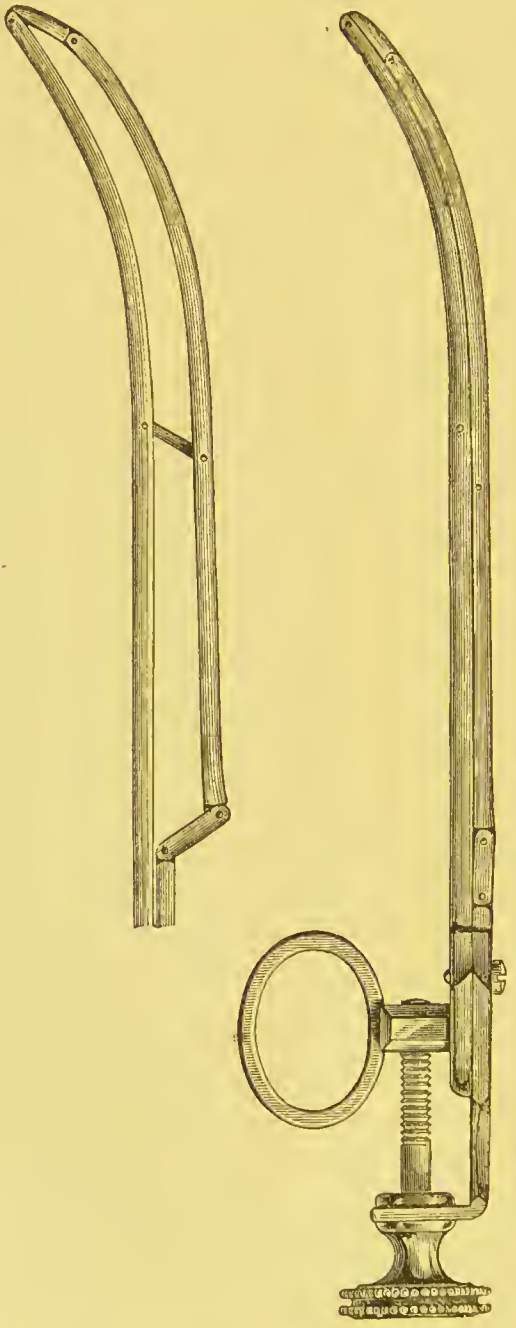
The canula scissors invented by Dr. A. H. Smith of New York, appears likely from its description to prove serviceable for the removal of neoplasms from the turbinated bones, but at present I have no practical acquaintance with it.

Mention was made in the preceding chapter of certain *malformations of the lower spongy bone* which tend to occlude the auditory channel of the nose, and are especially opposed to the introduction of the catheter. I have tried to

overcome this difficulty without occasioning a breach of tissue, by means of a dilator similar in principle to instruments adopted for stretching the rectum, etc. It is of the size of an ordinary silver catheter, and being nearly straight can, when closed, be insinuated beneath the spongy bone. By acting on the screw a gentle upward leverage is exerted upon the bone, the amount of pressure so exerted being increased with each application. This instrument figured below, has in several instances accomplished its object Hypertrophic enlargements of the anterior presenting aspect of the soft tissues of the *middle turbinated bone* are frequently met with, and as a rule, are most satisfactorily reduced by the application of a galvano-cautery point. Here also the importance of not wounding the septum is paramount, because owing to the close proximity of it to the middle turbinated bone, adhesion between the two surfaces would then be almost unavoidable. Occasionally the bone in this situation participates in the disease and blocks up the narrow upper nasal passage whereby the *sense of smell* is lost, though not necessarily destroyed. When it is remembered that we have now to deal with the ethmoid bone, the situation in view of operative procedures, assumes graver proportions than in the case of the inferior spongy bone, which is an almost isolated shelf projecting into the fossa and having no such important relationships as the ethmoid.

Notwithstanding, the removal of such an obstruction and excitant of catarrh has occasionally to be faced, and in such a way that it can be effected through the external meatus. For its accomplishment I have devised the

FIG. 25.



Author's dilator for widening the inferior nasal channel.

curved scissors figured below, and with these it is not difficult to excise a portion of this aspect of the bone, and so far as my experience of this operation goes, without

FIG. 26.

Author's Scissors for middle Turbinated Bone.

any ill consequences, but with decided relief to the symptoms.

Erectile tissue tumours of the posterior aspect of the inferior turbinated bone may, when fully developed and when of sufficient substance and firmness, be removed by the snare. Either the cold wire instrument introduced by Jarvis, or the galvano-cautery loop, is equally efficacious for this purpose. The more frequently posterior rhinoscopy is used in the diagnosis of nasal disease, the oftener will these tumours be found, and in every stage of development; most commonly they will be seen as small soft compressible masses scarcely extending beyond the choanæ, in which condition they are ill adapted for the foregoing treatment. They are, however, among the most pronounced sources of irritation, both local and reflex, of all the complications now under review. It is necessary therefore to devise means for their extirpation. Sometimes this may be accomplished by the galvano-cautery point, which must be accurately applied before the circuit is completed, and its position checked in the rhinoscopic mirror. This is a somewhat difficult but effectual mode of destroying the enlargement. Another plan is to touch the growth with some caustic applied through a shield, acetic acid being the best. The shield I use resembles the distal end of a no. 12 silver catheter, but flatter and very slightly curved; it is provided with a large oval-shaped eye near the end of the inner aspect of the curve. This is passed along the nostril until the eye applies itself to the growth, which may be ascertained by the finger passed behind the soft palate, or more agreeably

to the patient, by means of the mirror. A probe armed with cotton wool and moistened with the acid, is now passed along the tube to the end, and comes in contact with the tissue through the eye. Two or more such applications are usually required to secure a satisfactory result.

Acute turgescence of the erectile tissue of the nose must be regarded as a neurosis, in the sense in which this term is used and its meaning explained in previous chapters. Its treatment is essentially constitutional:—iron, strychnia, and other so-called nerve tonics should be administered internally, while, locally, such astringents as Ferric Alum ʒ j to Oss. water, may be applied with the spray apparatus to the nares. The Faradic current applied to the superior cervical ganglion beneath the angle of the jaw, the other pole being placed on the nape of the neck, is an important part of the treatment. Tobacco smoking, and alcoholic beverages should be used sparingly. Should these measures prove only partially successful, one or other of the operations detailed in the preceding paragraph for destroying or reducing the tissue, should be had recourse to.

Exaggerated degrees of *exostosis of the inferior turbinated bone*, associated with similar outgrowths from the septum and floor of the nasal cavity, will be most conveniently considered in connection with morbid states of those parts, which usually contribute the larger share of the obstruction.

Polypus.—Under this head it is necessary to protest against the prevalent custom of regarding every neoplasm encountered in the nose as one of polypus; and to insist

upon the necessity for more accurate diagnosis as the first step to efficient treatment. Equally to be reprehended is the ordinary method of tearing off nasal polypi with forceps, this being a slovenly operation, unnecessarily painful, and almost certain to be followed by a recurrence of the disease. The first point in treating polypus of the nose is to make out exactly the situation to which it is attached. It is impossible to do this without recourse to anterior and posterior rhinoscopy, the region being first cleared of secretion, and mopped dry with absorbent wool. Then by manipulating the growth with a probe, aided in some cases by palpation of the post-nasal space through the mouth, the position of the root of the growth will in most cases be ascertained. The surgeon now possesses the information which will enable him to make a successful operation, for it is this point of attachment that must be included in the loop of his snare or ecraseur.

Jarvis's instrument, or some modification of it, is the most generally useful one, inasmuch as in it piano-wire is employed, which does not readily kink, and is sufficiently elastic to retain the original shape of the loop, after overcoming the obstacles to its introduction. When the polyp has been thus removed, its base should be destroyed with the galvano-cautery electrode. For it will be found that the underlying mucous membrane is extensively hypertrophied, and unless this be dealt with as described, no great length of time will elapse before another and similar growth forms in the place of that removed. Polypus is usually multiple in its occurrence, unless the surgeon is so fortunate as to see the case from its com-

mencement. When more than one exist, each must be snared separately, but in the case of those which are so small as to present mere buds of polypoid proliferation, it will suffice to plunge the cautery into these, without previously using the snare.

When polypus has existed for a considerable length of time, and in some other cases of only short duration, the new formation will be found to conceal a stratum of exposed or necrosed bone. These are non-pedunculated, and have a broad base which renders them unamenable to the snare. Indeed they generally collapse with the attempt so to deal with them, when the true nature of the case becomes apparent, by laying bare the diseased bone beneath. I am unable to decide whether it is the implication of the muco-periosteum in the new departure, which unfits it for any longer supplying nutriment to the subjacent osseous structures, which accordingly perish of starvation—or, whether the polypoid tissue is the counterpart in mucous membrane, of the exuberant granulations seen elsewhere in association with dead bone. Which of these initiates the morbid process is, as I have said, a moot point; probably both may in different instances operate to this end.

Fortunately the decision of this question does not affect the treatment, which now consists not so much in getting rid of the polypus, as in the removal of the exposed surfaces of bone. A favourite site for the occurrence of this kind of necrosis associated with polypus, is the outer nasal wall, in the immediate neighbourhood of the opening into the antrum, and usually on the right side. Frequently the adjacent middle turbinated bone is implicated. It is not to

be denied that these cases present much difficulty in treating them through the external meatus, on account of the insufficient space through which any operation must be performed. The curved scissors (fig. 26) are of service here, as the thin plates of bone may be reached and excised by their means.

Frequently however it is necessary to adopt some modification of *Rouge's* operation, as practised in the case referred to in the previous chapter, of extensive *polypoid degeneration* of the Schneiderian membrane, accompanied with numerous pieces of dead bone, and in which it was found necessary to lay open the nasal fossæ, by dividing the intermediate tissues beneath the upper lip. Still more space may be gained by continuing the dissection upwards so as to liberate the alæ nasi from the face, when by severing the cartilage, the lower half of the nose may be turned upwards, and the nasal fossæ be laid open for inspection and operative manipulation. It is seldom that such a severe operation is demanded, but when carried out very little sign of this interference with the organ remains after recovery.

While these pages were in the press, I have performed this operation on a woman aged about 50, for extensive disease of the ethmoid extending backwards into the sphenoidal cells and body of the sphenoid bone, but who came to be treated for polypus. On reflecting the nose as above described, the finger was readily introduced, and after cutting away a large portion of the necrosed middle turbinated bone, could be passed backwards into a carious cavity formed in the sphenoid in the situations above

mentioned. All projecting points of diseased bone were carefully removed, but so extensive did the disease prove that the right side of the body of the sphenoid was reduced to a thin plate of bone, which alone intervened between the disease and the cranial cavity. The patient is still under treatment in the Throat hospital.

In the younger patient, also referred to, in whom the polyp buds were found to extend into the post-nasal space, after clearing the anterior nares, I ploughed up the surface of the mucous membrane with a rasparatory introduced through the anterior meatus, carefully guiding the instrument by the index finger of the left hand introduced behind the velum. When the bleeding ceased, the abraded surface was thickly dusted with tannin by means of an insufflator. In both these instances the treatment was followed by complete and rapid recovery.

The after treatment when simple polypi have been removed, consists in irrigations by means of a spray apparatus, two or three times daily, with the alkaline or permanganate lotions, and subsequently blowing a little tannin powder over the surface of attachment with an insufflator.

Various other methods of treating the disease are vaunted from time to time in the Journals. Such are injecting the polypi with spirits of wine, dilute acetic acid, &c. These methods will suffice in simple cases, where the point of attachment is unusually accessible, and where no complication exists, but are quite inadequate to deal with the general run of these cases.

It occasionally happens that a large polypus hanging

free in the post-nasal space will, by its weight, drag upon and elongate its stalk, so that at length it shows behind or below the velum, when looked at through the mouth. Such an occurrence is likely to happen when the disease originates from the posterior aspect of the middle turbinated bone, a favourite site for polypous growths. There is nothing peculiar in the phenomenon, except that from the ease with which such a growth can be removed, it is apt to be less radically treated, as regards its base, than the nature of the case requires.

The value of posterior rhinoscopy receives no better illustration than in the instances now under review. Both as an aid to the diagnosis of the situation of the tumours, and as a guide to their subsequent treatment, it solves much of their mystery, while lightening their management to a degree, which without its adoption, would be impossible; when coupled with the practice of exploring the posterior nares with the finger, an amount of certainty is added in both respects, which leaves little to be desired in regard either of a perfect diagnosis, or, considering the complexity of the region, of facile treatment.

Stenosis originating in the Nasal Septum.

Simple Deviation of the Septum, in my experience seldom calls for surgical interference, for when this deformity gives rise to obstruction, it does so usually because of other complications which will be shortly treated of. In

those exceptional instances in which it becomes necessary to relieve symptoms arising from divergence of the septum alone, Goodwillie recommends that a section containing the bend, be punched out of the partition by means of forceps devised by him for the purpose. I have never practised this operation, for the reasons above stated.

Adams's dilator, and plugs, are well adapted for the purpose of straightening a perverted septum, but as stated above, the range of cases in which this method of treatment is applicable, is a limited one. Notwithstanding Mr. Adams's dilator becomes a useful adjunct in completing operations of a more radical character.

The fact that a divergent septum derives its main importance from the superadded conditions of exostosis, or enchondrosis, has not been sufficiently recognised. Except as the result of fracture or displacement from violence, irregularities of the partition rarely assume a pathological importance when not thus complicated; in fact, the divergence is now due to the bony or cartilaginous outgrowth, which twists and displaces the middle wall, while adding the new bulk of the tumour to the obstructing process. Therefore an operation undertaken to relieve a deviation while neglecting the cause of it, must necessarily be followed by relapse. This series of events will be intelligible after reference to fig. 20 and its description.

Exostosis of the Septum proper, originating in the vomer, and extending towards the outer wall of the nose, requires to be perforated either with a drill or bradawl. Through the orifice thus obtained a small saw may be worked, and a sufficient portion of the mass removed, to re-establish the

breathway. This operation may be performed most safely with the finger in the post-nasal space, the patient being gagged and anæsthetised. Should the new orifice have a tendency to close up it may be re-opened by the galvano-cautery. It is matter of surprise how complete is the relief afforded by an orifice not so large as a pea, which in one case represented the permanent result of treatment, for to this size was the much larger operation-bore reduced, before recovery was complete. Yet this patient could breathe freely through that nostril, and what was eminently satisfactory to him, he was able thereafter to blow his nose, the previous inability to do so having been his principal annoyance.

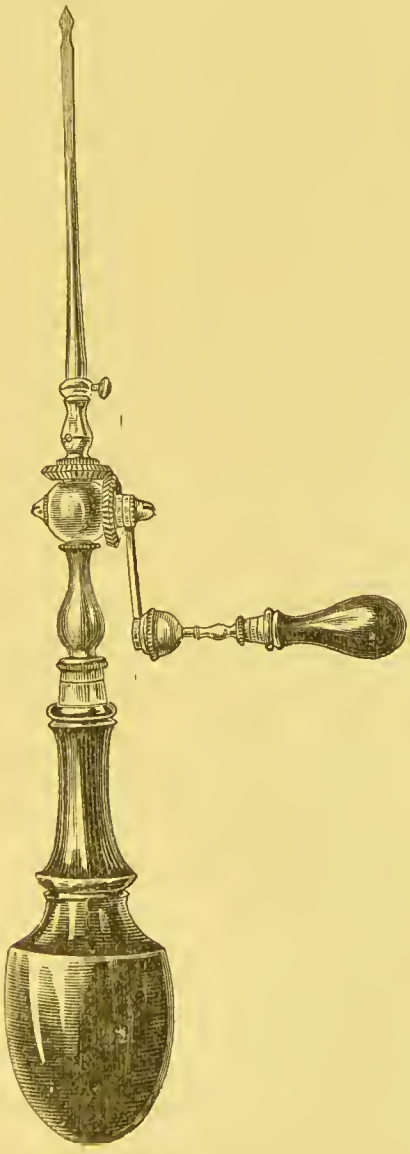
A useful form of surgical drill is figured on next page—

The small saws of various shapes will be found of great service in nasal operations; their use is attended with as little bleeding as is that of the galvano-cautery.

It is quite practicable with one or other of these saws to remove small exostoses of the septum, where sufficient room for working it exists, without prior recourse to drilling. Some fibroid tumours in this situation may be removed with this instrument, which indeed has been growing in favour with me since I commenced using it in nasal operations some five years ago.

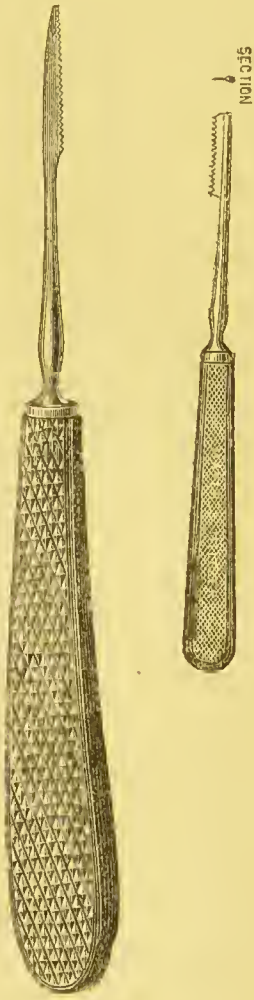
Enchondrosis though springing from the anterior cartilaginous portion of the septum, may spread backwards over the vomer, and from its situation give rise to the impression that the case is one of exostosis. The comparative softness of the tumour at once settles the diagnosis.

FIG. 27.



Surgical Drill.

FIGS. 28, 29.



Various shapes of Author's nasal saws. Fig. 29 is drawn half size.

When located in the anterior portion of the nose this doubt will not arise.

Treatment consists in destroying the growth by penetration with the galvano-cautery electrode, at one or more points, according to the size of the tumour. In no other form of nasal disease does this plan of treatment yield better results than in that of enchondrosis of the septum. A large solid boss projecting into the fossa may in this manner be rapidly removed, and with the infliction of the smallest amount of breach of surface. Hence recovery is more rapid than when other means of removal are adopted. At the same time, it should be stated, that where a suitable battery and requisite electrodes are not at hand, any form of this obstruction may be removed with the saw, or gouge, or both, and with equally good results, except that a wound of the surface corresponding in size to that of the base of the tumour, will remain to be healed by granulation, and this process will extend over three or four weeks or longer. Therefore when rapidity of recovery is an object the cautery should be employed.

Mention has been made of the occurrence of *cystoid degeneration* in these cartilaginous tumours, under which circumstance they attain their largest dimensions, growing occasionally with great rapidity. The treatment in this complication is the same as previously. The electrode is passed into the swelling and applied freely to the interior, after which rapid subsidence takes place.

It is quite common for enchondrosis to attack both sides of the septum, each plate of cartilage taking on the same morbid action. When this happens, the enlargement of one side does not necessarily correspond with that of the other. It may do so, but on the other hand these tumours

may develope at any part of the partition, (see fig. 20.) Occasionally, when the thickening occurs symmetrically, and both tumours are removed, a gap is left on recovery which causes the two fossæ to communicate. *Perforation of the cartilaginous septum* will result, also, when there is strongly marked divergence of the septum associated with the growth, after removal of the latter. Such a result of treatment is by no means to be regarded as an untoward accident; it is often impossible to be avoided, and is moreover of no consequence as it does not interfere with the contour of the nose, and the patient will remain in ignorance of the condition unless purposely informed of its existence.

Hypertrophic induration, or thickening of the muco-periosteum of the vomer at its posterior aspect, can only be accurately diagnosed by the rhinoscopic mirror. Its removal is effected by the galvano-cautery, or the nasal saw, applied through the anterior nares, the operation being guided by the mirror.

Fibroid growths attached to the posterior aspect of the vomer, may arise from the coalescence of the preceding condition, and the subsequent expansion of the tumour. The relations to adjacent parts must be accurately defined by palpation. If practicable the wire loop of the snare should be passed round each half, when excision may be effected of each, in turn. In the case figured in the preceding chapter, this was not possible (fig. 22); and having no cautery apparatus at hand, I endeavoured to detach the growth from its connections by means of a curved rasparatory. In this I was only partially successful, and antici-

pated failure as the result. A gradual disintegration of the tumour, however, followed the operation, this process being accompanied by a sharp attack of herpes of the face. After an interval of twelve months this patient presented herself for treatment of the resulting deafness, at which time very little trace of the growth existed, the choanæ being perfectly defined and free from obstruction.

It is most undesirable, however, to conduct any operation in this region, which has for its object the sloughing away of a considerable mass of tissue. Tearing off a polypus is similarly reprehensible, because in either case septic fever is to be feared, with probably fatal results. From this point of view the galvano-cautery in its many forms and varied appliances comes to the timely assistance of the surgeon. It is peculiarly apposite for the destruction of such tumours as those now under review, and which cannot be included in the loop of the ecraseur. The cautery knife, introduced through the anterior nares cold, should, when heated, be pushed into the growth, cutting downwards and upwards, parallel with the vomer and close to it; when one side is thus detached, the other may be similarly dealt with. The current should be disconnected from time to time, in order to check the steps of the operation with the finger.

True fibromata growing from the vault of the pharynx are occasionally encountered. There is no reason to regard these as having a catarrhal origin, and their treatment belongs rather to the domain of the general surgeon than to that of the specialist.

Dislocation of the septum from the anterior maxillary spine,

is a rare occurrence in my experience except as the outcome of strain, or pressure, exerted upon the septum by a concurrent growth, or exaggerated deviation.

Removing the growth will usually allow the partition to adapt itself to its normal situation. Exostosis of the floor of the nose in its anterior aspect occurred in one case, and required the use of the gouge and saw for its removal. This sufficed to reduce the dislocated cartilage, and gave a perfect result. Enchondrosis is the more frequent cause of displacement, which goes on gradually, step by step, with the growth of the former. The cartilaginous enlargement being removed as previously described, the septum resumes its normal position.

In traumatic cases, and perhaps in some others of an uncomplicated nature, the operation practised by Goodwillie may be performed. It consists in "making an incision over the protruding end of the septum and spine, denuding the soft parts, pushing them back and amputating the septum with the excising nasal forceps or punch. The soft parts are then brought together and united by suture."

It is desirable to point out a precaution to be observed in operating with the galvanic cautery through the anterior nasal meatus. When the ordinary dilating speculum with metal blades is used, the latter are apt to get heated by contact with the electrode, and to burn the vestibule, and the skin around the orifice of the meatus, the surgeon being meanwhile quite unaware of the fact. To avoid this unnecessarily painful and possibly disfiguring result, I have had my operating speculums fitted with

ivory blades in place of metal ones, which do not conduct the heat. Further to avoid this contretemps, I have my electrodes covered with a thin plate of ivory up to the commencement of the platinum end, by which means the heat is further cut off from the chance of contact with adjacent parts not included in the operation.

After Treatment of Nasal Operations.

Surgical procedures within the nasal cavity are generally succeeded by sharp febrile conditions. As already hinted, this is least likely to happen after operations upon the inferior turbinated bones, but it is to be looked for when any other intrinsic element of the nasal edifice has suffered lesion at the hands of the surgeon. The temperature begins to rise on the 2nd day, and rapidly reaches 102° or 103°. By the fifth or sixth day the patient is usually convalescent. It is necessary to watch the case carefully, and I usually prescribe Quinine and Digitalis as soon as the thermometer records 101°, and also about the 3rd day, a calomel and saline purge.

In some delicate patients,—and the conditions of nasal stenosis imply a want of constitutional stamina in these subjects — a good deal of debility follows the operation.

For this reason I usually continue the Quinine for 2 or 3 weeks, adding thereto Iron &c. as indicated. When the effect of the operation is fairly passed, these patients develope an amount of energy and vigour to which they had

been previously strangers, but which is not to be wondered at, seeing what enlarged freedom of respiration is accorded by the operation.

As regards local treatment, it suffices to spray the anterior nares with a simple detergent lotion: the following answers well.

℞ Sodæ sulpho-carbolat . . ʒ ij
Boric acid . . . . . ʒ ss
Aquam ad . . . . . ℥ viij

Warm, and apply with spray apparatus two or three times daily.

After each application of the above a light plug of boric wool may be placed against the injured surface. Under any circumstance the patient should be kept in bed for a few days.

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